OHIO AGRICULTURAL EXPERIMENT STATI
AT
WOOSTER, OHIO

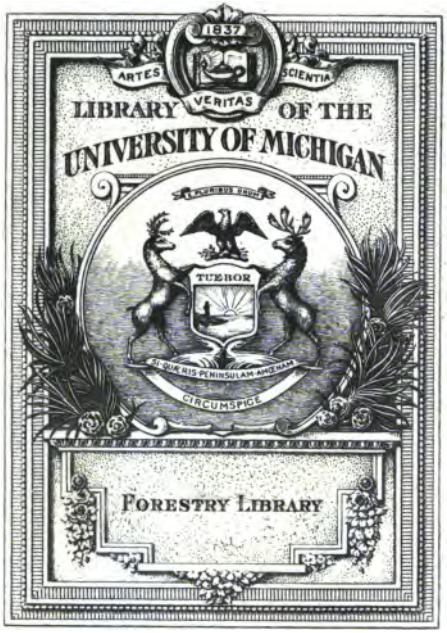
CHAS. E. THORNE, Director
...rector

...CE
U. S. DEPARTMENT OF AGRICULTURE

WOOD-USING INDUSTRIES OF OHIO

BY
CARROLL W. DUNNING,
U. S. Forest Service

1912



OHIO AGRICULTURAL EXPERIMENT STATION

AT

WOOSTER, OHIO

CHAS. E. THORNE, Director
EDMUND SECREST, Forester

In Cooperation with the
FOREST SERVICE
U. S. DEPARTMENT OF AGRICULTURE
HENRY S. GRAVES, Forester

WOOD-USING INDUSTRIES OF OHIO

BY

CARROLL W. DUNNING,

U. S. Forest Service

1912

EXPERIMENT STATION PRESS

CONTENTS.

LIST OF ILLUSTRATIONS

ANNOUNCEMENT

The study upon which this report is based was undertaken by the Ohio Agricultural Experiment Station in cooperation with the Forest Service, the work being done under the direction of Edmund Secrest, Forester of the Experiment Station, and O. T. Swan, In charge Office of Industrial Investigations, Forest Service, United States Department of Agriculture. The Statistics were compiled from data collected in the summer of 1912, covering a period of one year from January 1 to December 31, 1911, inclusive. By the terms of this cooperative agreement, the Ohio Agricultural Experiment Station is authorized to publish the findings of the investigation.

Wood-using Industries of Ohio

INTRODUCTION

With her many rail and water transportation facilities, and with her vast resources of soil, forests, coal, oil, gas, iron, stone and clay, Ohio stands high as a manufacturing State. In 1910 the value added to the raw material by the varied manufactures of the State amounted to considerably more than $600,000,000. For the same period the Bureau of the Census report shows that the sale of farm products reached a value of $216,000,000, and that the minerals produced, exclusive of clay products, an estimated value of $159,000,000. Manufacturing, therefore, is preeminently Ohio's leading industry. The present report deals with a single class of factories, those manufacturing commodities from wood. They form one of the most important divisions of Ohio's enterprises, and nearly every State in the Union as well as many foreign countries send some portion of their forest material to Ohio for utilization in manufacture. The commodities turned out by these wood-using factories, together with the value of the rough forest products like lumber, shingles, cross-ties, etc., in 1909, amounted to nearly $156,000,000. Compared with the value of farm products and the mineral resources, the part the forests and their related industries are taking in the commercial development of Ohio is thus clearly indicated.

In the early days of lumbering the eastern States, closer to the markets, were plentifully supplied with hardwoods similar to those growing in Ohio, and in consequence there was little incentive to ship the rough lumber to outside points. At the same time, in comparison with the softwoods needed by the rapidly growing population for building purposes, there was no demand for hardwoods at home. In order that the magnificent hardwood forests could be profitably exploited, the necessity of developing a home market was soon realized, and resulted in the establishment of industries like those concerned in this investigation.

FOREST CONDITIONS

When the pioneers crossed the Appalachians and began to settle in Ohio, the entire State with the exception of the northwestern corner was covered with a magnificent forest. The

eastern and northeastern part held valuable stands of white pine. Hemlock, too, was scattered on the high hills. The remainder of the State was a forest of deciduous growth. Probably in no section of the United States were there finer hardwoods than in the Ohio valley, particularly in the central and southern portions of this State. Magnificent specimens still to be seen standing here and there confirm this and make one realize the almost inconceivable wealth Ohio had in her timbered lands. For a long time, and even today, manufacturers making high grade products specify woods cut in Ohio and Indiana, considering their quality superior to similar growth in other States. On the uplands forests the principal trees were the oak, hickory, sugar maple, white ash, yellow poplar, black walnut, black cherry, basswood, and beech. In lower areas grew the elm, soft maple, black ash, sycamore, willow, red gum, bur oak, hackberry, cottonwood and red gum.

Fig. 1. A representative of the original forest.

To the early settlers only the rich soil had a potential value. The vast forests were of no worth. In fact, owing to the expense of clearing, tree growth was a factor to decrease land values. Annually many hundreds of acres of the finest hardwoods in the world were cut and burned, and later, when the early lumbermen started their mills, the farmer, anxious to get the trees out of his way, voluntarily rendered assistance in felling and logging them without thought of remuneration for his labor or timber.

For many years there was no demand for timber products. The first market, it has been stated, was found at New Orleans, and a few rafts were floated down. Before there was any considerable transportation development, Cincinnati became the center for tanbark. To supply the demand gigantic oaks, valuable at that time only for their bark, were cut down and afterwards rolled together and burned.

With the influx of new settlers came the towns. This necessitated the sawmills, and from 1820 until the present time Ohio has held an important place among the States in the production of rough lumber. There were more than 1,900 sawmills operating in Ohio in 1860. This number was steadily maintained for several decades, when the failing timber supply began to be felt and the larger mills were compelled to move to other regions. In 1910, 1,532 mills were still operating in Ohio. These were mostly portable mills of small capacity. Their combined cut in 1910 was 542,000,000 feet as against 990,000,000 feet sawed in 1900, a decrease of more than 45 percent.

The present forest lands of Ohio are found mainly in farm woodlots except in the southern part where there are rough and sterile lands more valuable for growing timber than crops. The woodlots vary in size and condition and only comparatively recently have the farmers begun to show interest in the proper management of them. The northeastern part of the State, as already noted, is where the pine and hemlock now grow; in the north, hard maple, ash, and oak predominate; in the southern portions the woodlots contain mostly oak, beech, elm, sycamore, chestnut and poplar. Those of the greatest commercial importance are the oaks, ashes, beech, maples, yellow poplar, the hickories, chestnut and elms.

PURPOSE OF STUDY

The study of the wood-using industries of Ohio presents data on a subject and along lines not heretofore attempted in the State, although similar studies haye been made in other States. Eventually

the information from all the States will be correlated in a national study, and a series of publications relating to the wood using industries and the commercial woods of the United States will be issued by the U. S. Forest Service.

The Ohio investigation has been conducted under the same plan followed in other States. Cards indicating the information desired, particularly the amount of each wood employed and the exact use of each wood, were mailed to all the wood-using manufacturers of the State. Inquiries were also included as to the form in which the raw material was desired at the factory and the methods now followed in the utilization of factory waste. To study the processes of manufacturers of certain commodities and special waste problems at close range, agents traveled through the State. They also solicited data from manufacturers who had not sent in reports by mail. The manufacturers cooperated willingly. Both the Ohio Experiment Station and the Forest Service appreciate the aid and consideration given them.

No attempt was made to ascertain the amount of lumber cut by the sawmills of the State or the quantities of wood going into rough products like veneer, lath, shingles, cross-ties, cooperage stock, posts, telegraph and telephone poles, and paper pulp. For a number of years such information has been collected and reported annually by the Bureau of the Census. A copy of a part of the last Census Bulletin, to the extent to which it refers to Ohio, is presented in the appendix of this report.

Apart from the industries making the above-named products, there are scattered through Ohio over 1,600 factories using lumber as their raw material. The question as to what becomes of the lumber produced by the sawmills is answered by this and similar reports. For instance, the amount of white oak demanded for furniture, together with all the other furniture woods, is shown; likewise the amount demanded for making flooring, wagons, farm implements and machinery, automobiles, pianos boxes, railroad cars, sporting goods, matches, etc. The form of the raw material from which to make the many commodities, the prices paid, and the different sources of the material are also given.

The Ohio Experiment Station and the Forest Service are constantly receiving inquiries from points throughout Ohio and nearby States concerning markets for various kinds of timber and lumber, and for advice on profitable utilization of mill and factory waste. This report will answer many of these questions. A directory of the names and addresses of all manufacturers supplying the data

supplements the report. It is classified in the order corresponding to the tabulated information. For example, Table XLIV, gives information on match manufacturers, while under the same heading in the directory appear the names of the firms making matches and buying the various woods listed. Similarly from the "List of Uses of Woods," one can find commodities best suited for the material he has to sell. Information concerning the industry including the selected products can be ascertained from the table of contents and then from thedirectory the names of the manufacturers making them.

The farmer, the timber owner, and the sawmill man will be instructed by this report in the information it gives of the kinds of wood the manufacturers use, in what form they want it, and approximately the prices paid. It also gives the names and addresses of the consumers. The manufacturers in turn are benefited in the added opportunities for buying raw material and occasionally in finding in the waste of other factories suitable material for making their wares. The report may also suggest to manufacturers substitutes of cheaper woods for the more costly ones they are using, besides pointing out the chief regional sources from which the industries procure their raw materials. Dealers handling wooden commodities in other States can learn what the Ohio manufacturers have to sell, and those outside of Ohio who are in position to furnish raw material can find what the manufacturers demand. The bulletin also contains data useful to those concerned in the work of outlining the policies of the State for forest protection and development.

FOREST IMPROVEMENT NECESSARY

From the Census Report we learn that over 63,000 wage earners in Ohio are dependent upon the wood-using industries and the sawmills. These establishments, aside from the sale of the raw material, add to the wealth produced in the State each year $96,000,000. At present the home-grown timber is far short of the two hundred million feet of lumber required for the maintenance of the wood-working factories. Small tracts of valuable hardwoods are still to be found in the western part of the State, but it will not be many years before these have been consumed. The business men of Ohio should therefore appreciate the economic importance of the forests and lend every aid and encouragement to the work the State is carrying on in protecting and developing them.

Ohio first began to recognize the importance of forestry in 1885, when the Legislature authorized a Bureau of Forestry. This was largely due to the influence and work of the Ohio State Forestry Society together with the assistance of the Ohio Horticultural Society,

which organizations have done much towards promulgating right ideas and fostering a sentiment in favor of conservation. Later on the Bureau of Forestry was made a department under the supervision of the Board of Control of the Ohio Agricultural Experiment Station, and as soon as practicable was placed in charge of the State Forester, technically trained on all subjects pertaining to scientific forestry. A careful survey of the forest conditions of the State is being conducted, the Forester having already finished the field work in thirty counties, and presented the results in annual reports.

Fig. 2. Production of lumber, veneer, cooperage stock, cross-ties, etc., in Ohio that are not included in this study but are referred to in the appendix of the report.

Cooperative work is being carried on with owners of woodlots throughout the State. In 1911, 50,000 acres of private forest land were being managed by the State Forester under cooperative agreement to improve or conserve the productive capacity. On a number of reservations set aside by the Commonwealth for the use of public institutions, small areas of woods or sections that are untillable have been turned over to the care of the Agricultural Experiment Station for forestry purposes. Eight of these are already under forest management, and upon six others the work has been started or working plans formulated. Several municipalities of the State have set aside areas for park purposes, and have turned them over to the supervision of the Agricultural Experiment Station for forest management. Cincinnati has acquired 600 acres for this purpose,

and Cleveland and Oberlin smaller parks. These areas afford excellent opportunities for demonstration in planting and the practice of forestry.

In addition to the work of woodlot management, considerable progress has been made with planting. Already 3,000 acres of land privately owned and a few small areas of State land have been given over to forest plantations. A large portion of the nursery stock used in this work was taken from the nurseries maintained by the State for the distribution of seedlings, the annual output of which at present amounts to about 375,000, and the capacity of 1,500,000 seedlings and transplants.

Fig. 3. Group of young hickories ready to take the place of old ones recently cut for vehicle stock.

At the recent Constitutional Convention an amendment was adopted empowering the State to purchase lands and likewise to use tax-reverted lands for timber reserves. In various parts of the State there are areas not suitable for farming. Some of these in the southern part, previously referred to are contiguous lands covered with more or less valuable second growth. If these and smaller areas are converted into State forests they will prove to be of considerable economic importance, first, as a factor in forestry education; second, in the advantage of the State having an income from

Fig. 4. Showing the development of white ash planted in central Ohio in 1875.

lands heretofore non-productive; and third, a constantly growing supply of timber at home would benefit the wood-using factories and other industries of the State.

Equitable taxation of forest lands and fire protection are probably the most important factors in the practice of forestry and in influencing the success of a State wide forest policy. The late Constitutional Convention considered the subject of forest taxation in Ohio and adopted an amendment permitting the enactment of laws separately classifying forest lands for taxable purposes. This will doubtless be followed in the near future by the Legislature establishing a system of timber land assessment based on the income or yield.

Considerable interest has been shown in the subject of the State adopting a policy of fire protection for Ohio timberlands and it is believed that the necessary legislation providing for it will soon follow. It is no less imperative for the woodlot State to control forest fires than for the timbered State. This policy does not entail the provision of sufficient funds for fire fighting, but the maintenance of an organized fire patrol and fire observation stations throughout the danger season. The experience of other States has proved this system more economical not only in fighting fires but in lessening property loss. It was to encourage the States to recognize the importance of such measures that Congress enacted Section 2 of the Weeks Law, providing Federal aid for any State that established and actively maintained a paid forest fire organization. A number of the States have availed themselves of this opportunity with generally gratifying results.

KINDS OF WOOD

Table I brings together all woods purchased by the manufacturers according to species, irrespective of their use, and listed in the order of their amounts. There are sixty of them, all prominent in the lumber market. Eight grew in foreign countries. They are: Mahogany, Spanish cedar, Circassian walnut, padouk, English oak, teak, ebony, and rosewood, and they are all high-priced. It is interesting to note the large amounts of western wood that the Ohio manufacturers demanded. Seven came from forests of the Pacific Coast States, amounting to more than 14,000,000 feet. Douglas fir was the principal one, followed by sugar pine and western white pine, which were imported to compete with Michigan and Minnesota white pine. Others from the same region reported in quantities of less than 1,000,000 feet were: Redwood, western red cedar, western white pine and Sitka spruce. Of the shipped-in material the southern

TABLE I. Summary of kinds of wood used in Ohio

Kind of wood		Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio	Grown out of Ohio
Common name	Botanical name	Feet b. m.	Percent			Feet b. m.	Feet b. m.
Yellow poplar	*Liriodendron tulipifera*	139,094,784	15.20	$ 29.42	$4,092,344	9,308,846	129,785,937
White pine	*Pinus strobus*	120,340,930	13.15	29.68	3,572,169	25,000	120,315,930
White oak	*Quercus alba*	100,891,654	11.02	37.23	3,756,033	46,374,342	54,517,312
Longleaf pine	*Pinus palustris*	73,432,252	8.02	26.26	1,928,610	.....	73,432,252
Shortleaf pine	*Pinus echinata*	71,334,721	7.79	25.75	1,836,638	.....	71,334,721
Red oak	*Quercus rubra*	61,096,273	6.67	31.46	1,921,936	22,962,781	38,133,492
Cypress	*Taxodium distichum*	38,038,570	4.16	36.33	1,381,758	.....	38,038,570
Hickory	*Hicoria (sp.)*	35,621,331	3.89	42.67	1,519,840	12,021,589	23,599,742
Sugar maple	*Acer saccharum*	29,000,061	3.17	28.19	817,461	12,438,925	16,561,136
Red gum	*Liquidambar styraciflua*	27,609,659	3.02	22.69	626,445	266,919	27,342,740
White ash	*Fraxinus americana*	24,511,381	2.68	36.18	886,705	16,497,876	8,013,505
Basswood	*Tilia americana*	22,833,367	2.49	25.27	577,068	7,692,077	15,141,290
Chestnut	*Castanea dentata*	18,770,383	2.06	19.68	369,398	2,567,708	16,182,675
Beech	*Fagus atropunicea*	18,637,884	2.04	17.52	326,519	6,510,581	12,127,302
Norway pine	*Pinus resinosa*	17,654,417	1.93	23.47	414,407	.....	17,654,417
Cottonwood	*Populus deltoides*	16,831,024	1.84	29.56	497,559	240,600	16,590,424
Hemlock	*Tsuga canadensis*	16,164,964	1.77	18.58	300,332	100,000	16,064,964
White elm	*Ulmus americana*	13,902,484	1.52	23.93	332,717	9,302,119	4,600,365
Silver maple	*Acer saccharinum*	9,328,214	1.02	17.78	165,863	2,403,599	6,924,615
Birch	*Betula (sp.)*	8,394,563	.92	35.15	295,046	228,898	8,165,665
Cork elm	*Ulmus racemosa*	7,411,570	.81	18.47	136,891	6,831,570	580,000
Black ash	*Fraxinus nigra*	6,122,309	.67	33.37	204,292	4,797,322	1,324,987
Douglas fir	*Pseudotsuga taxifolia*	5,819,733	.64	34.60	201,373	.....	5,819,733
Sugar pine	*Pinus lambertiana*	5,411,891	.59	46.45	251,399	.....	5,411,891
Mahogany	*Swietenia mahagoni*	4,712,348	.51	128.85	607,201	.....	4,712,348
Spruce	*Picea (sp.)*	3,575,750	.39	22.21	79,419	.....	3,575,750
Black walnut	*Juglans nigra*	2,922,040	.32	77.29	225,838	678,390	2,243,650
Cotton gum	*Nyssa aquatica*	2,450,000	.27	39.47	96,700	.....	2,450,000
Western white pine	*Pinus monticola*	1,072,000	.12	46.76	50,129	.....	1,072,000
Bur oak	*Quercus macrocarpa*	1,026,000	.11	39.00	40,015	889,000	137,000

TABLE 1.—Continued. Summary of kinds of wood used in Ohio

Kind of wood		Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
Common name	Botanical name	Feet b. m.	Percent				
Red cedar	*Juniperus virginiana*	953,810	.10	$ 28.63	$27,309	.....	953,810
Cherry	*Prunus serotina*	947,881	.10	69.68	66,048	279,599	668,282
Northern white cedar	*Thuja occidentalis*	944,540	.10	19.16	18,102	.....	944,540
Buckeye	*Aesculus glabra*	930,992	.10	21.07	19,614	533,000	397,992
Sycamore	*Platanus occidentalis*	902,250	.10	23.58	21,276	784,250	118,000
Redwood	*Sequoia sempervirens*	876,000	.10	36.73	32,174	.....	876,000
Balm of Gilead	*Populus balsamifera*	688,820	.08	17.13	11,800	.....	688,820
Black gum	*Nyssa sylvatica*	674,500	.07	16.51	11,137	314,500	360,000
Tamarack	*Larix laricina*	600,000	.07	17.00	10,200	.....	600,000
Cucumber	*Magnolia acuminata*	521,800	.06	16.66	8,692	521,800	.....
Western red cedar	*Thuja plicata*	510,000	.06	30.20	15,400	.....	510,000
Spanish cedar	*Cedrela odorata*	478,750	.05	124.32	59,517	.....	478,750
Pitch pine	*Pinus rigida*	468,000	.05	17.03	7,970	115,000	353,000
Western yellow pine	*Pinus ponderosa*	450,000	.05	45.89	20,650	.....	450,000
Loblolly pine	*Pinus taeda*	449,000	.05	18.32	8,225	.....	449,000
Western larch	*Larix occidentalis*	213,000	.02	22.50	4,792	.....	213,000
Hackberry	*Celtis occidentalis*	200,000	.02	16.13	3,225	200,000	.....
Willow	*Salix (sp.)*	170,000	.02	27.06	4,600	157,000	13,000
Butternut	*Juglans cinerea*	82,500	.01	39.26	3,239	79,500	3,000
Sweet magnolia	*Magnolia glauca*	75,000	.01	12.00	900	.....	75,000
Circassian walnut	*Juglans regia*	32,470	*	284.39	9,234	.....	32,470
Sitka spruce	*Picea sitchensis*	28,000	*	40.89	1,145	.....	28,000
Applewood	*Malus malus*	24,000	*	20.00	480	24,000	.....
Padouk	*Pterocarpus indicus*	14,500	*	133.16	1,930	.....	14,500
Locust	*Robinia pseudacacia*	12,000	*	35.83	430	6,000	6,000
English oak	*Quercus robur*	10,000	*	410.00	4,100	.....	10,000
Teak	*Tectonia grandis*	1,000	*	250.00	250	.....	1,000
Ebony	*Diospyrus ebenum*	500	*	240.00	120	.....	500
Rosewood	*Dalbergia (sp.)*	500	*	350.00	175	.....	500
	Total	915,272,369	100.00	$30 47	$27,884,839	165,174,792	750,097,577

*Less than 1-100 of one percent.

states supply more, both in quantity and kinds, than any other region. Yellow pine—longleaf and shortleaf in nearly equal quantities—heads the list, but the oaks, cypress, red gum, chestnut, cottonwood, hickory and poplar furnished a large percent of the demand. The Lake States region contributed the largest part of the white pine, which, in amount, constituted over 40 percent of all the woods going into further manufacture. Most of the sugar maple reported came from this region, and also the beech and hemlock. Michigan furnished the most and Minnesota next. Only four woods were supplied entirely by Ohio-cut timber. They were: Cucumber, hackberry, applewood and pitch pine. Western larch sent in from Rocky Mountain regions and sweet magnolia from Louisiana are included in the list. The proportion of the total of the different woods listed as grown in or out of the state is also shown. In every instance where a species was reported as partly grown within the state, the average price of the home-grown wood was less than the cost of the material coming from outside.

***TABLE II. Home grown woods used and amount and percent of each shipped in from other States.**

Kind of wood	Grown in Ohio		Grown out of Ohio	
	Feet b. m.	Percent	Feet b. m.	Percent
Applewood	24,000	100.00	.....	....
Ash (black)	4,797,322	78.36	1,324,987	21.64
Ash (white)	16,497,876	67.31	8,013,505	32.69
Basswood	7,692,077	33.69	15,141,290	66.31
Beech	6,510,582	34.93	12,127,302	65.07
Birch	228,898	2.73	8,165,665	97.27
Buckeye	533,000	57.25	397,992	42.75
Butternut	79,500	96.36	3,000	3.64
Cherry	279,599	29.50	668,282	70.50
Chestnut	2,587,708	13.79	16,182,675	86.21
Cottonwood	240,600	1.43	16,590,424	98.57
Cucumber	521,800	100.00	.....	.....
Elm (cork)	6,831,570	92.17	580,000	7.83
Elm (white)	9,302,119	66.91	4,600,365	33.09
Gum (black)	314,500	46.63	360,000	53.37
Gum (red)	266,919	.97	27,342,740	99.03
Hackberry	200,000	100.00	.....	.....
Hemlock	100,000	.62	16,064,964	99.38
Hickory	12,021,589	33.75	23,599,742	66.25
Locust	6,000	50.00	6,000	50.00
Maple (silver)	2,403,599	25.77	6,924,615	74.23
Maple (sugar)	12,438,925	42.89	16,561,136	57.11
Oak (bur)	889,000	86.65	137,000	13.35
Oak (red)	22,962,781	37.58	38,133,492	62.42
Oak (white)	46,374,342	45.96	54,517,312	54.04
Pine (pitch)	115,000	24.57	353,000	75.43
Pine (white)	25,000	.02	120,315,930	99.98
Poplar (yellow)	9,308,846	6.69	129,785,937	93.31
Sycamore	784,250	86.92	118,000	13.08
Walnut (black)	678,390	23.22	2,243,650	76.78
Willow	157,000	92.35	13,000	7.65
Total	165,172,792	24 10	520,272,005	75.90

*Discussion of table on following page.

WOODS GROWN IN OHIO

Table II is a summary of State grown woods, and offers a comparison of the amounts of the same woods shipped in from the producing regions of other States. Different from Table I, this summary groups the species alphabetically as to genus instead of in their numerical order. Sixty woods were reported by the Ohio manufacturers and a part of or all of 31 of them were cut in the State. The oaks were the most important as to quantity demanded, followed by the ashes then the elms, maples and hickories mentioned according to the quantity used. (See Table II on page 18).

To correct any inaccuracies in separating the information according to species as they appear in the summary and the industry compilations, Tables III to XXXIX present the data according to kinds of wood. For example, the white elm and cork elm have been combined and are shown under a single heading—"elm"—likewise the oaks, the gums, the cottonwoods, etc. The principal home-grown woods and a few domestic and foreign woods important as to distribution were the ones so treated and a brief account of them and their apportionment among the industries are as follows:

OAKS

The oak is the most abundant tree growing in Ohio. In trade there are two general classes, white oak and red oak, but botanically they are about equally divided among more than twenty species. The most important are: White oak (*Quercus alba*) red oak (*Quercus rubra*), bur oak (*Quercus macrocarpa*), chestnut oak (*Quercus prinus*), pin oak (*Quercus palustris*), black oak (*Quercus velutina*), and scarlet oak (*Quercus coccinea*). Among the others are chinquapin oak, post oak, overcup oak and black jack oak. The wood of the white oaks ranks first in general utility and is superior to any of the red oaks. They are, however, slow growing species and on account of the long time rotation will probably not be extensively planted when the present supply is exhausted. Red oaks, on the other hand, are fairly rapid growers. The total amount of oak consumed in Ohio is more than 163,000,000 board feet reported by thirty different industries. They form the largest part of the home-grown woods of any of the species, representing nearly one-half of all the woods that were reported as cut in the State. The industries making planing mill products, flooring, wainscoting and other interior finish, alone required over 37,000,000 feet of oak or 22.7 percent of the total, and furniture makers 14.2 percent of the total. These industries,

together with vehicles, car construction, sash, doors, and general mill work, demand a sufficient amount to equal nearly 73 percent of the total consumption of the wood. The remaining 27 percent is divided among 25 other industries in varying small amounts as follows:

TABLE III. Oaks

Industry	Quantity used annually		Average cost per 1,0000 ft.
	Feet b. m.	Percent	
Planing mill products	37,024,682	22.71	$39.16
Furniture	23,120,041	14.18	40.53
Vehicles and vehicle parts	22,862,012	14.03	37.07
Car construction	22,106,292	13.56	26.39
Sash, doors, blinds and general mill work	14,558,697	8.93	41.70
Agricultural implements	11,225,700	6.91	25.64
Boxes and crates	6,199,945	3 80	14.93
Fixtures	5,482,305	3.36	45.37
Chairs	3,495,000	2.14	34.26
Plumbers' woodwork	3,175,000	1.95	33.15
Miscellaneous	2,558,000	1.57	30.35
Handles	2,325,372	1 43	29.14
Refrigerators and kitchen cabinets	1,724,056	1.05	29.99
Ship and boat building	1,262,000	.78	39.31
Machine construction	1,207,500	.74	35.93
Equipment, playground	1,100,000	.67	14.09
Dairymen's, poulterers' and apiarists' supplies	767,000	.47	13.76
Frames and molding	547,325	.34	49.11
Instruments, musical	425,000	.26	28.16
Caskets and coffins	402,000	.25	54.43
Tanks and silos	400,000	.25	85.00
Woodenware and novelties	280,000	.17	16.79
Laundry appliances	210,000	.13	34.29
Bungs and faucets	165 000	.10	16.55
Sporting and athletic goods	110,000	.07	60.23
Pulleys and conveyors	100,000	.06	33.00
Saddles and harness	87,000	.05	22.86
Brushes	75,000	.05	25.00
Elevators	29,000	.02	35.86
Total	163,013,927	100.00	$35.08

Fig. 5. A white oak and a fine stand of reproduction.

YELLOW POPLAR

According to the quantity used, the manufacturers demand more yellow poplar than any other wood. Nearly 140,000,000 feet were consumed in 1911. Of this amount Ohio furnished nearly 7 percent. Its usefulness can be determined by its distribution among the industries. Thirty out of 35 call for yellow poplar and next to sugar maple it entered into more uses than any other wood purchased by the Ohio manufacturers. Its most exacting use is probably for barrel bungs and for that purpose nearly 7 percent of the total used in Ohio is annually required. The planing mills use the greatest amount of it, followed by the box makers, who, according to the prices shown in the table following, use only the low grades. They paid less than $16 per thousand feet, which was the lowest average price reported for yellow poplar by any of the industries. The percent going into each class can be noted in the table following.

In Ohio the yellow poplar tree next to oak is probably the most important. It is found in all parts of the State standing on rather moist soils along streams. It grows to very large dimensions and is in no way related to the true poplars, cottonwood, aspen, etc. Yellow poplar is probably the most common name that the wood bears in the market, but in different localities it goes as tulip tree wood, tulip poplar and whitewood.

TABLE IV. Yellow poplar

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Planing mill products	43,394,080	31.20	$31.71
Boxes and crates	38,779,666	27.88	15.94
Sash, doors, blinds and general mill work	20,324,206	14.61	35.66
Bungs and faucets	9,620,000	6.92	27.30
Vehicles and vehicle parts	8,918,884	6.41	52.92
Car construction	4,598,715	3.31	43.50
Furniture	3,086,703	2.22	30.43
Miscellaneous	2,135,000	1.53	21.53
Agricultural implements	1,530,700	1.10	37.38
Fixtures	1,421,600	1.02	37.42
Pumps	988,000	.71	48.86
Refrigerators and kitchen cabinets	894,987	.64	22.41
Instruments, musical	823,000	.59	45.41
Plumbers' woodwork	650,000	.47	17.31
Caskets and coffins	340,000	.24	26.76
Pulleys and conveyors	280,000	.20	22.71
Frames and molding	271,251	.19	34.47
Dairymen's, poulterers' and apiarists' supplies	253,000	.18	30.30
Cigar boxes	246,491	.18	82.85
Machine construction	175,000	.13	37.71
Patterns and flasks	90,000	.06	35.00
Sporting and athletic goods	80,000	.06	22.63
Laundry appliances	40,000	.03	25.00
Chairs	40,000	.03	35.50
Ship and boat building	50,500	.04	45.25
Brushes	30,000	.02	40.00
Elevators	15,000	.01	32.67
Trunks and valises	10,000	.01	32.00
Woodenware and novelties	8,000	.01	40.00
Total	139,094,783	100.00	$29.42

ASHES

Nearly 50 percent of the white ash and more than 60 percent of the black ash is demanded annually in Ohio for handles. It goes into long tool handles such as rakes, hoes, shovels, forks and D handles. The vehicle makers and the car builders come next in demanding this wood, the latter industry uses it for interior finish of cars, especially trolley cars, for which purpose its handsome figure, strength and ability to hold its shape makes it well adapted. Furniture makers use it for cheap grades such as kitchen safes and cabinets, and for butter tubs it is the favorite of all woods because it is considered less liable than any wood to impart a taste to the contents. There are five species of ash growing in Ohio, but it is difficult to distinguish them in the wood. A number of manufacturers use ash indiscriminately, as many of the individual reports indicate, while not a few separate them into two general classes known on the market as white ash and black ash. Twenty-two of the 36 industries in Ohio report using this wood. They are:

TABLE V. Ashes

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Handles	16,961,322	52.10	$31.24
Vehicles and vehicle parts	7,786,828	25.42	43.81
Car construction	2,579,700	8.42	47.83
Planing mill products	1,049,100	3.42	33.70
Dairymen's, poulterers' and apiarists' supplies	861,000	2.81	43.40
Woodenware and novelties	506,000	1.65	32.65
Agricultural implements	369,000	1.20	34.13
Sash, doors, blinds and general mill work	289,000	.94	44.89
Furniture	274,640	.90	25.03
Miscellaneous	222,000	.72	14.28
Ship and boat building	203,000	.66	35.22
Boxes and crates	180,000	.59	17.20
Saddles and harness	110,000	.36	30.00
Instruments, musical	76,600	.25	50.71
Plumbers' woodwork	50,000	.16	30.00
Trunks and valises	23,000	.08	34.35
Sporting and athletic goods	20,000	.07	36.00
Machine construction	20,000	.07	38.00
Pulleys and conveyors	20,000	.07	30.00
Chairs	12,000	.04	30.00
Fixtures	12,000	.04	38.00
Frames and molding	9,000	.03	47.58
Total	30,633,690	100.00	$35.61

ELMS

Four elms are found in Ohio, the white or American elm (*Ulmus americana*), the red or slippery elm (*Ulmus pubescens*), the rock or cork elm (*Ulmus racemosa*) and the winged elm (*Ulmus alata*). The white elm and the slippery elm are more frequent and more widely distributed, the former being the most important commercially but on the market rarely any distinction is made. The trees are usually distinguished by the bark and the leaf; the inner bark of the slippery elm being mucilaginous and nutritious and has a leaf with a very rough upper surface, whereas the white elm leaf has a smooth surface and the outer bark, like all of the other elms, is deeply furrowed. Elm wood has properties which fit it for a number of special uses. In some respects it is one of the best American woods, its elasticity, for instance, is exceeded only by hickory. Bicycle rims have been largely made of it on account of its resiliency and tensile strength, the same qualities that have made it preeminently the best wood for patent barrel hoops. Its scarcity prevents its use for many articles where it would be of exceptional value. Generally a large supply of elm goes into the manufacture of farm implements, slack barrel staves for flour barrels, bent parts of chairs and vehicle bodies, banjo rims, piano case parts, etc. The principal uses in Ohio are indicated by the industries calling for it, which are:

TABLE VI. Elms

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Vehicles and vehicle parts	7,284,878	34.18	$18.40
Boxes and crates	7,074,109	33.19	24.35
Dairymen's, poulterers' and apiarists' supplies	1,095,000	5.13	22 73
Handles	3,083,307	5.08	22.06
Furniture	870,000	4.08	26.02
Trunks and valises	760,000	3.57	23.91
Planing mill products	548,260	2.57	22.00
Fixtures	536,000	2.51	20.99
Chairs	510,500	2.40	27.40
Instruments, musical	460,000	2.16	23.74
Agricultural implements	253,000	1.19	26 80
Equipment, playground	250,000	1.17	18 80
Saddles and harness	172,000	.81	22.47
Machine construction	140,000	.66	28 25
Refrigerators and kitchen cabinets	70,000	.33	24.00
Brushes	65,000	.30	30 00
Woodenware and novelties	50,000	.23	16 00
Elevators	30,000	.14	25.00
Patterns and flasks	25,000	.12	20.00
Sash, doors, blinds and general mill work	25,000	.12	22.48
Car construction	12,000	.06	40.00
Total	21,314,054	100.00	$22.03

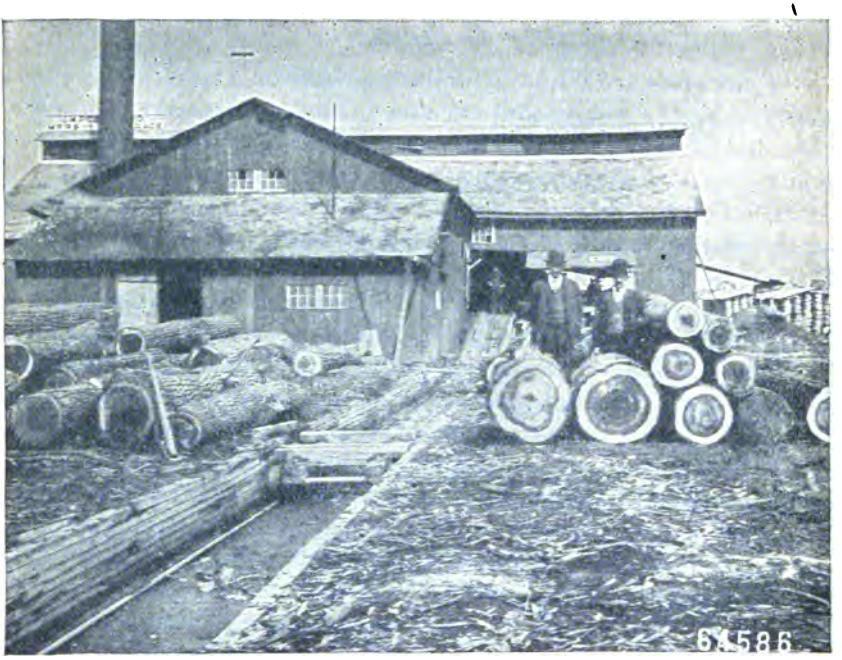


Fig. 6. Elm logs cut in Ohio waiting to be manufactured into barrel hoops.

Fig. 7. Soft maple and white elm logs in the yard of a basket factory. (Statistics included under Box Industry.)

MAPLES

Five maples grow in the State of Ohio. They are the silver maple (*Acer saccharinum*), the red or scarlet maple (*Acer rubrum*), the sugar maple (*Acer saccharum*), the black maple (*Acer saccharum nigrum*), and the ash-leaf maple or box elder (*Acer negundo*). The black maple is found only in the southern part of the State. The red maple prefers moist soil but it also grows on slopes and ridges, and is found generally throughout the State. The silver maple is usually found following the rivers and streams and on the edges of swamps. The red and silver maples contribute the soft maple lumber, the former being more abundant, and hard maple is from the sugar maple tree. The sugar maple is commercially the most important in the State and grows in all localities except swamps. It supplies practically all of the maple sugar produced in Ohio and its wood next to white oak is called on for by a greater number of users than any lumber the Ohio manufacturers demand. Today, the maples with the oaks lead in the manufacture of hardwood flooring. It goes into various kinds of furniture, especially hidden work of case goods like drawer sides, bottoms, mirror backs, etc., and is used for finish in upholstered furniture where it is stained in imitation of expensive cabinet woods. The occurrence of curly or bird's eye, mostly in the hard maple, makes it extremely valuable in the manufacture of highly artistic furniture usually for bed rooms. Its less

common uses are for machine parts, saddle trees, stirrups, ox-yokes, clothespins, whipstocks, shoe lasts, pegs and lamps. Vehicle makers employ both maples extensively for various purposes and for turnery, the two with beech are the principal woods. They also serve for staves chiefly for sugar barrels and to a large extent for veneers. In the distillation of hardwoods for charcoal, wood alcohol and the acetates the maples are held in high favor. Soft maple is lighter than hard maple, and is hard, strong, brittle, close-grained, compact, easily worked. The color of the wood is light brown tinged with red and has lighter sapwood.

TABLE VII. Maples

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Boxes and crates	8,007,396	20.99	$14.61
Planing mill products	5,814,910	15.17	27.89
Furniture	4,526,201	11.81	26.85
Agricultural implements	4,270,500	11.14	28.04
Handles	3,835,496	10.01	22.71
Vehicles and vehicle parts	2,536,701	6.62	43.91
Instruments, musical	2,369,000	6.18	28.44
Fixtures	1,849,400	4.82	25.62
Woodenware and novelties	715,000	1.87	20.50
Miscellaneous	610,000	1.59	41.43
Car construction	517,295	1.35	34.18
Machine construction	514,000	1.34	23.13
Chairs	509,000	1.33	25.31
Sash, doors, blinds and general mill work	493,000	1.29	32.37
Refrigerators and kitchen cabinets	335,209	.87	22.21
Plumbers' woodwork	320,000	.83	25.31
Pulleys and conveyors	255,000	.67	23.31
Elevators	250,000	.65	30.00
Laundry appliances	220,000	.57	29.54
Instruments, professional and scientific	130,000	.34	27.23
Dairymen's, poulterers' and apiarists' supplies	97,000	.25	19.37
Brushes	80,417	.21	28.46
Patterns and flasks	32,500	.08	25.23
Saddles and harness	30,000	.08	30.00
Ship and boat building	10,000	.03	30.00
Frames and molding	250	*...	36.00
Total	38,328,275	100.00	$24.72

*Less than .01 of 1 percent.

HICKORIES

The mockernut (*Hicoria alba*), the pignut (*Hicoria glabra*), the bitternut (*Hicoria minima*), the shagbark (*Hicoria ovata*), the shellbark (*Hicoria laciniosa*), and the small fruited hickory (*Hicoria microcarpa*) are found in Ohio. The species grow more or less generally throughout the State. The woods of the different hickories are very similar, thus making it difficult to distinguish them. Consequently, the lumber dealers and manufacturers make no attempt to keep the species separate and little information is

Fig. 8. Shagbark hickories growing in Ohio.

Fig. 9. A bitternut hickory growing in southern Ohio.

available as to the quantity of each kind cut within the State. An early use was for tool handles and this probably more than any other today distinguishes hickory from other woods. On shipboard and in ship building it is used, but in the latter case only for parts entirely submerged. Belaying pins, oars and pegs are other boat parts usually made of hickory. The hoop pole business has drained the forests of the hickory sapling to a great extent, but in late years sawed hoops made from other woods have begun to replace it to a marked degree. Nearly half of the manufactured hickory goes into the production of spokes and other vehicle parts. Owing largely to variety of special uses to which this wood is put great waste has been occasioned, and it is probable that its waste has exceeded that of any other valuable tree. The wood of hickory is heavy, very hard and strong, tough, close-grained, compact and flexible. The medulary rays are numerous and thin, color brown, sapwood nearly white.

TABLE VIII. Hickory

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Vehicles and vehicle parts	29,324,100	82.32	$44.34
Handles	3,436,935	9.65	24.14
Agricultural implements	1,691,500	4.75	43.87
Sporting and athletic goods	511,000	1.43	81.14
Planing mill products	178,000	.50	25.31
Instruments, professional and scientific	125,000	.35	32 80
Boxes and crates	105,000	.29	24.52
Furniture	103,000	.29	24 68
Woodenware and novelties	63,000	.19	59.28
Brushes	30,000	.08	50.00
Car construction	18,296	.05	36.13
Chairs	14,000	.04	28.57
Machine construction	10,000	.03	38.00
Sash, doors, blinds and general mill work	10,000	.03	40.00
Ship and boat building	2,000	.01	37.50
Trunks and valises	500	*	26.00
Total	35,621,331	100.00	$42 67

*Less than 1-100 of 1 percent.

BASSWOOD

Two species of basswood grow in Ohio; they are the basswood (*Tilia americana*) and the white basswood (*Tilia heterophylla*). The former is the more important, more widely distributed throughout the State and is the wood found in commerce under the name of linn. Practically all makers of wooden wares find use for basswood, and Ohio builders demand it to a limited extent for interior and exterior construction work, and sometimes for siding. Large quantities in the form of thin lumber goes into furniture, for the unexposed parts like drawer bottoms, backs of case goods, etc., while in

the same form it is a favorite for trunk boxes and the best trunks are made from it, usually 3-ply stock. Twenty-three of the 36 industries reported using basswood in large quantities. Among them the vehicle manufacturers use it for bodies, and pyrographers favor it ahead of any wood for their art.

TABLE IX. Basswood

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Boxes and crates	4,333,000	18.98	$20.13
Woodenware and novelties	3,914,000	17.14	22.69
Trunks and valises	3,038,340	13.31	24.73
Dairymen's, poulterers' and apiarists' supplies	2,270,000	9.94	26.55
Furniture	1,558,500	6.82	27.17
Sash, doors, blinds and general mill work	1,140,000	4.99	27.66
Planing mill products	1,110,660	4.86	26.68
Instruments, musical	1,013,000	4.44	38.34
Fixtures	762,300	3.34	25.53
Handles	708,385	3.10	23.39
Agricultural implements	683,000	2.99	28.15
Miscellaneous	630,000	2.76	24.13
Frames and molding	572,200	2.51	35.72
Vehicles and vehicle parts	427,000	1.87	28.53
Car construction	177,982	.78	27.91
Instruments, professional and scientific	150,000	.66	39.00
Refrigerators and kitchen cabinets	134,000	.59	28.29
Laundry appliances	70,000	.31	25.86
Saddles and harness	41,000	.18	22.80
Chairs	40,000	.17	30.00
Caskets and coffins	25,000	.11	28.00
Machine construction	25,000	.11	26.00
Patterns and flasks	10,000	.04	35.00
Total	22,833,367	100.00	$25.27

BEECH

Beech grows throughout Ohio on well-drained situations, mixed with oak, maple, ash and hickory. This tree seems disposed to decay in its later stages and much of the mature timber in the State is not sound. It is quite tolerant of shade and reproduces readily from seed and by sprouts. This as well as the fact that until within comparatively recent years beech was not valuable as timber and was therefore left standing accounts for its presence in nearly every woodlot in Ohio and often to the exclusion of many other more important hardwoods. Some trees are found having a large percent of sapwood which is whitish in color, hence the name in commerce white beech, while the red heart-wood answers to red beech. On account of its dense shade and freedom from disease and insects, beech is a desirable tree for ornamental purposes. Probably its first commercial use was for charcoal, more on account of its abundance than any special quality that it possesses. Beech furnishes

more material for wood distillation than any species, though birch and maple have been considered equally as suitable. In recent years it has been growing in favor as a flooring wood. It takes a high polish, is very hard, tough, strong, close-grained. Since preservative treatment has developed, beech has been found to be an admirable wood for outdoor use when treated. This accounts for its recently going into railroad ties, fence posts, etc. Where toughness is not considered beech is almost equal to hickory. Automobile and vehicle parts, plane stocks, turned chairs, cog wheels, wedges, faucets, veneer, clothespins and broom handles are among the many uses it is called to meet. The wood is fairly difficult to season and if great care is not exercised it is liable to warp and check.

TABLE X. Beech

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Boxes and crates	7,338,629	39.37	$14.24
Brushes	2,383,694	12.79	18.02
Vehicles and vehicle parts	2,260,000	12.13	19.70
Handles	2,075,916	11.14	20.43
Planing mill products	1,199,000	6.43	21.67
Agricultural implements	833,000	4.47	22.18
Sash, doors, blinds and general mill work	500,000	2.68	19.76
Woodenware and novelties	450,000	2.41	13.34
Machine construction	402,000	2.16	17.99
Miscellaneous	318,350	1.71	19.00
Instruments, musical	144,000	.77	18.50
Chairs	130,000	.70	18.92
Equipment, playground	100,000	.54	20.00
Instruments, professional and scientific	100,000	.54	22.00
Pulleys and conveyors	100,000	.54	20.00
Furniture	95,000	.51	20.79
Saddles and harness	90,000	.48	30.00
Ship and boat building	51,500	.28	20.29
Laundry appliances	40,000	.21	21.00
Fixtures	20,000	.11	25.00
Car construction	4,200	.02	20.00
Dairymen's, poulterers' and apiarists' supplies	2,000	.02	10.00
Frames and molding	595	*	30.25
Total	18,637,884	100.00	$17.52

*Less than 1-100 of 1 percent.

CHESTNUT

The chestnut is found extensively in the woodlots of northeastern, eastern and southern Ohio and is especially common on the glacial drift. Chestnut does not usually occupy the richest soil, but ridges and slopes where soil is thin. It is a fast growing tree, and reproduces exceptionally well and for that reason a few years ago it began receiving attention in woodlot management. Lately, however, the fungus disease (*Diapoetha parasitica*) has made great inroads on

the standing chestnut of the country, and until the control of the blight is assured, the advisability of using it as a planting tree must be passed over. In the days of wood fences chestnut was used more than any other tree for fencing. It is durable in exposed situations and underground, which accounts for its being a favorite for telephone and telegraph poles, railroad ties, shingles, coffiins and caskets. Chestnut was late coming into general use as lumber, and it might be said that it did not come into commercial prominence long before 1900. Since that time its cut per annum has increased four or five fold. The manufacturers of furniture and pianos had much to do with bringing it into favor, demanding it above any wood for veneer backing or cores. Being cheaper than oak and having an attractive figure, chestnut has become a leading wood for exterior trim and store and office fixtures. It yields more tanning extract than any other wood and with the growing scarcity of tan bark every year more chestnut will go to the extract plants. The wood of the chestnut is light, soft, not strong, coarse-grained and liable to check and warp. The layers of annual growth are marked by many rows of large, open ducts. The color is brown with lighter sapwood.

TABLE XI. Chestnut

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Boxes and crates	6,343,739	33.80	$13.85
Caskets and coffins	3,128,000	16.66	19.55
Furniture	2,257,100	12.02	20.92
Instruments, musical	1,666,000	8.88	18.19
Sash, doors, blinds and general mill work	1,581,475	8.43	29.51
Planing mill products	1,413,000	7.53	31.37
Fixtures	968,445	5.16	22.31
Agricultural implements	406,000	2.16	18.47
Miscellaneous	350,000	1.86	18.00
Dairymen's, poulterers' and apiarists' supplies	240,000	1.28	18.00
Plumbers' woodwork	110,000	.59	22.64
Trunks and valises	100,000	.53	35.00
Sporting and athletic goods	80,000	.43	27.75
Car construction	52,224	.28	24.09
Vehicles and vehicle parts	25,000	.13	48.00
Refrigerators and kitchen cabinets	24,000	.13	20.71
Frames and molding	23,400	.12	41.03
Chairs	2,000	.01	22.00
Total	18,770,383	100.00	$19.68

WHITE PINES

Though the lumber cut shows that thirteen mills cut white pine in only limited amounts it is not possible to ascertain whether the logs were brought in from other states to the Ohio mills or whether they were cut in the extreme northeastern part of the State where

in a limited area white pine appears. The manufacturers report using but 25 M feet of home grown white pine and import more of it than any other wood. Next to yellow poplar more of it goes into manufacturing in Ohio than any of the sixty woods reported.

Table XII following represents three different species because they appear on the market indiscriminately under the name white pine. They are in order of their importance, white pine (*Pinus strobus*) growing in the Lake states; Norway or red pine (*Pinus resinosa*) which grows associated with white pine, and usually sold mixed with it, and western white pine (*Pinus monticola*) that comes from Idaho, Montana and Washington. The last named is similar to the eastern pine but the wood is a little more brittle, harder and heavier. The average cost of the western white pine being $20 per M feet above the eastern wood can be accounted for in that most of the former was purchased in the upper grades, while a larger part, 24 percent, of the latter was bought at low prices to be used only for packing boxes and crating.

TABLE XII. White pines

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Planing mill products	46,357,393	33.23	$31.97
Boxes and crates	35,949,790	25.77	16.59
Matches	24,250,000	17.38	34.75
Sash, doors, blinds, and general mill work	18,972,500	13.60	34.99
Car construction	4,258,739	3.05	30.98
Caskets and coffins	3,615,000	2.59	28.82
Dairymen's, poulterers' and apiarists' supplies	2,350,000	1.68	30.00
Patterns and flasks	1,024,700	.73	56.37
Agricultural implements	878,000	.63	30.28
Machine construction	490,000	.34	33.83
Ship and boat building	344,000	.25	40.06
Tanks and silos	262,000	.19	47.08
Woodenware and novelties	202,000	.14	38.12
Cigar boxes	199,425	.14	19.60
Instruments, musical	147,000	.11	47.45
Fixtures	57,000	.04	40.00
Refrigerators and kitchen cabinets	50,000	.04	32.00
Pumps	40,000	.03	22.50
Bungs and faucets	37,000	.03	18.00
Pulleys and conveyors	35,000	.02	35.00
Vehicles and vehicle parts	10,800	.01	39.63
Total	139,520,347	100.00	$28.99

SYCAMORE

Sycamore grows most abundantly in Ohio on the bottom lands of the streams and on areas bordering swamps and marshes. It grows perhaps to be the largest of any of the common

trees in the State. It is easily distinguished by the striking whiteness of its bark and by the fact that it holds its button balls throughout the winter. It is valuable for the protection it affords river banks and islands against washing. The sycamore's ability to grow on wet lands has had a great deal to do with its preservation for the present market supply. It was formerly used almost entirely for butcher blocks and refrigerator linings, but these special uses are not so important as its demand for veneer in built-up lumber. Quarter-sawed sycamore is rapidly growing in popularity. It has a striking grain and goes into sewing machines, furniture, cabinet work and interior finish. Plain sycamore serves for farm implement parts, washing machines, wooden bowls, tool handles and wooden screws and blocks. The uses it serves in Ohio can be discerned from the industries calling for it. The wood is heavy, hard, not strong, very close grained, compact, difficult to split and work. The medullary rays are numerous and conspicuous. Heartwood is brown tinged with red, and sapwood is lighter colored.

TABLE XIII. Sycamore

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Planing mill products	324,750	36.00	$25.72
Boxes and crates	200,000	22.17	14.25
Miscellaneous	150,000	16.63	18.00
Agricultural implements	85,000	7.42	31.76
Sash, doors, blinds and general mill work	62,500	6.93	38.43
Instruments, musical	40,000	4.43	32.00
Furniture	15,000	1.66	35.00
Refrigerators and kitchen cabinets	15,000	1.66	15.00
Vehicles and vehicle parts	4,000	.44	35.00
Brushes	3,000	.33	16.00
Dairymen's, poulterers' and apiarists' supplies	2,000	.22	20.00
Handles	1,000	.11	12.00
Total	902,250	100.00	$23.58

BLACK WALNUT

Ohio is one of the first states in the production of walnut lumber but the fact that the lumber was manufactured there does not necessarily mean it grew in Ohio, though it is found throughout the State. Owing to its value as lumber and its ability to grow fairly rapidly it is a favorite tree for planting. Walnut lumber in earlier days was not appreciated as much at home as in European countries and up to the present time more high grade walnut is sent abroad than is used in America. It has long been used for gunstocks—its most exacting use—because it is strong, handsome, and shows stains less than any

other available wood. It is called on for a great number of uses, but principally for sewing machines, furniture, cabinets, caskets, pews, pulpits and other ecclesiastical furniture. Also for cabinet and pipe organs, parts of automobile bodies, billiard tables, clock cases, etc. In Ohio fourteen industries report buying black walnut. They are listed in the following table:

TABLE XIV. Black Walnut

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Planing mill products	2,103,500	71.99	$ 69.05
Miscellaneous	350,000	11.98	134 29
Instruments, musical	167,800	5.74	103.50
Vehicles and vehicle parts	80,850	2.77	50.06
Sash, doors, blinds and general mill work	54,000	1.85	51.57
Bungs and faucets	51,000	1.75	30.15
Furniture	50,900	1.74	67.88
Caskets and coffins	20,000	.68	74.00
Fixtures	12,600	.43	59.84
Machine construction	10,000	.34	38.00
Plumbers' woodwork	10,000	.34	80.00
Car construction	9,000	.31	90.00
Frames and molding	1,390	.05	38.80
Chairs	1,000	.03	70.00
Total	2,922,040	100.00	$ 77.29

BUCKEYE

The horse chestnut (*Aesculus hippocastanum*), and the buckeye (*Aesculus glabra*), the former being probably the more common, both grow in Ohio. Lumbermen and manufacturers make no distinction between the wood of the two species. Buckeye, like cucumber, often loses its identity and goes to market mixed with yellow poplar. It is called for separately, however, by the manufacturer of artificial limbs to meet its most exacting use and occasionally by turneries and makers of novelties and athletic goods. Together with yellow poplar it goes for weather boarding, siding and casing and other uses in building for which yellow poplar is required. Buckeye is light, soft, close-grained, compact and difficult to split. The color of the wood is creamy white and quite uniform as the sapwood is hardly distinguishable.

TABLE XV. Buckeye

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Boxes and crates	561,992	60.36	$14.36
Frames and molding	214,000	22.99	35.61
Miscellaneous	75,000	8.06	21.00
Furniture	60,000	6.44	35.00
Planing mill products	20,000	2.15	12.50
Total	930,992	100.00	$21.07

Fig. 10. Ohio buckeye tree (*Aesculus glabra*).

CUCUMBER TREE

The cucumber (*Magnolia acuminata*) is quite common in Ohio, growing along the banks of rivers and streams. In the extreme southern and southwestern part of the State in timber situations elkwood (*Magnolia tripetala*), its relative, is found in occasional stands. Cucumber usually passes on the market as yellow poplar or whitewood, and as such enters into manufacture for uses similar to yellow poplar. It is considered the best wood for pump logs and water pipes, and this special use gives it the special recognition it receives in consuming markets. The wood is light, soft, durable, not strong, close-grained, compact, satiny. Color is yellow-brown, sapwood lighter, often nearly white.

TABLE XVI. Cucumber

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Woodenware and novelties	500,000	95.82	$17.00
Boxes and crates	20,000	3.83	7.00
Dairymen's, poulterers' and apiarists' supplies	1,000	.19	20.00
Agricultural implements	800	.16	40.00
Total	521,800	100.00	$16.66

BIRCHES

Three species of birch grow in Ohio but none very extensively. Sweet or cherry birch (*Betula lenta*) grows sparingly throughout the State, while yellow birch (*Betula lutea*) is found only in the extreme northeastern part. Black birch (*Betula nigra*) of little commercial importance grows scatteringly on the lowlands in the southern part of the State. Considering the importance of birch as a cabinet wood the amount the Ohio manufacturers use is surprisingly small. The largest part is probably sweet birch and goes into commodities where it frequently is stained in imitation of mahogany. So well does it serve for this purpose that the imitation finish is difficult to discern from the real mahogany. Eighteen industries report birch in various amounts, but "sash, doors, blinds and general mill work," "planing mill products," and "store and office fixtures" were the ones which called for the largest quantities and together used 60 percent of all that was reported.

TABLE XVII. Birches

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Sash, doors, blinds and general millwork	1,918,890	22.86	$ 43.19
Planing mill products	1,717,000	20.45	36.79
Fixtures	1,443,844	17.20	37.80
Furniture	877,896	10.45	30.82
Boxes and crates	765,000	9.11	14.10
Vehicles and vehicle parts	358,000	4.27	43.55
Agricultural implements	350,000	4.17	13.00
Refrigerators and kitchen cabinets	252,106	3.00	30.13
Plumbers' woodwork	235,000	2.80	28.91
Instruments, musical	125,000	1.49	30.48
Frames and molding	105,200	1.25	87.64
Handles	100,000	1.19	26.00
Woodenware and novelties	91,000	1.08	44.86
Car construction	54,927	.66	39.67
Trunks and valises	1,500	.02	114.67
Total	8,394,563	100.00	$35.15

GUMS

Black gum is a common name given in various localities to the three gum trees, cotton gum or tupelo (*Nyssa aquatica*), water gum (*Nyssa biflora*), and black or sour gum (*Nyssa sylvatica*). Red gum, though it bears the name, botanically is not a relative of these species and therefore has been treated under a separate heading. Two of the above named species, cotton and black gum, are used in Ohio, but only the latter (*Nyssa sylvatica*) grown within the State. It is found frequently in wet lowlands, but also thrives on slopes. Its bright green foliage attracts attention in the summer and in the fall it yields clusters of two or three oblong berries of black color and sour in taste. The wood of the black or sour gum has an interlaced fibre and is difficult to split and work, which makes it valuable for particular uses, as for vehicle hubs, pulleys, mine rollers, mauls and mallet heads and cogs. In the form of veneer it goes into wooden dishes, berry cups, fruit baskets and veneer boxes. None of these uses were shown for it in Ohio, the entire quantity, as lumber, was reported for boxes and crates. Tupelo too was used for boxes and box shooks, but its greatest demand was for cigar boxes in the form of veneer. As lumber it went into cistern pumps, furniture and kitchen cabinets.

TABLE XVIII. Gums (black and cotton)

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Cigar boxes	1,810,000	57.93	$43.71
Boxes and crates	850,000	27.20	16.96
Pumps	300,000	9.60	40.00
Furniture	150,000	4.80	16.00
Refrigerators and kitchen cabinets	14,500	.47	14.97
Total	3 124,500	100.00	34.51

CHERRY

Numerous species of cherry are found in Ohio but the black cherry (*Prunus serotina*) is the only lumber tree and its wood is reported by the Ohio wood-using industries. It is found quite generally throughout the woodlots and forests of the State but is never abundant. The principal demand for cherry has always been for furniture and finish. It goes into expensive furniture mostly as veneer and is seldom seen in any other form. It does not warp readily and the quality gives it a place in the manufacture of electrical appliances, musical instruments, and commends it above any wood electro type backing. The wood is light, hard, strong, close-straight-grained, compact, easily worked. Medullary rays are numerous and thin. Color is red, growing darker with exposure.

TABLE XIX. Cherry

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Car construction	613,581	64.73	$76.24
Planing mill products	62,000	6.54	58.31
Machine construction	55,000	5.80	38.00
Instruments, musical	47,500	5.01	82.59
Sash, doors, blinds and general millwork	46,500	4.91	50.32
Plumbers' woodwork	41,000	4.33	51.95
Ship and boat building	26,000	2.74	88.46
Fixtures	25,600	2.70	41.17
Vehicles and vehicle parts	12,000	1.27	62.50
Boxes and crates	8,000	.84	25.50
Furniture	5,700	.60	89.12
Patterns and flasks	5,000	.53	74.00
Total	947,881	100.00	$69.68

RED GUM

Twenty-two industries call for red gum and the quantity demanded equals more than 3 percent of the total of all woods manufactured in Ohio. The several industries and the amount of red gum they consume are listed in the following table, but the specific use for which the wood is demanded and the qualities commending it are referred to later on in the discussion of the individual industry tables. Red gum (*Liquidambar styraciflua*) is often called sweet gum. In Ohio it grows only in the southern part in the wet soil of bottomlands and is easily identified by its beautiful star-shaped leaves and the characteristic wing-like projection of the bark from its smaller branches. Compared with other woods it is not an important lumber tree, though in 1910 the sawmills in the State cut one and one-half million feet.

The wood is fairly soft, straight and close-grained. The sapwood is light in color, almost white, and the heartwood a light red brown. Users frequently report the sapwood under the name sap gum, and the figured heartwood, which sometimes resembles the color and markings of Circassian walnut, as hazel wood or hazel. In foreign countries the term satin walnut is often given it, believing the name will add to its prestige as a cabinet wood. The growing demand for quarter sawed red gum is meeting the expectations of manufacturers, especially when sawed one inch thick as the grain markings of the transtangential cut is notably effective. Next to oak and maple red gum is demanded in Ohio for more uses than any other wood. It appears in 36 of the 41 industries listed and besides is the leading material for slack staves and for veneer.

TABLE XX. Red gum

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Planing mill products	9,016,000	32.66	$22.43
Boxes and crates	5,623,025	20.37	17.06
Furniture	2,766,300	10.02	25.21
Cigar boxes	1,798,270	6.51	17.77
Vehicles and vehicle parts	1,633,064	5.91	26.09
Refrigerators and kitchen cabinets	1,221,000	4.42	23 40
Agricultural implements	1,117,000	4.05	20.60
Sash, doors blinds and general millwork	1,006,000	3.64	32.29
Frames and molding	1,005,000	3.64	40.15
Handles	960,000	3.48	23.67
Instrumental, musical	420,000	1.52	29.43
Miscellaneous	265,000	.96	20.83
Chairs	243,000	.88	30.06
Bungs and faucets	175,000	.63	20.00
Fixtures	145,000	.53	26.79
Plumbers' woodwork	85,000	.31	24.47
Casket and coffins	75,000	.27	27.49
Pulleys and conveyors	22,500	.08	14.93
Woodenware and novelties	21,000	.08	25.71
Car construction	8,000	.03	26.00
Trunks and valises	3,500	.01	34.86
Patterns and flasks	1,000	*	45.00
Total	27,609,659	100.00	$22.69

* Less than 1-100 of 1 percent.

COTTONWOOD

Cottonwood (*Populus deltoides*) belongs to the willow family and is the species most largely cut into lumber. Its relatives growing in Ohio are the large-tooth aspen (*Populus grandidentata*), and the Balm of Gilead (*Populus balsamifera*). The latter is not frequent and the former does not often grow to a size large enough for lumber. Owing to the difficulty in seasoning cottonwood it is better

adapted for veneer than lumber. It is popular with the manufacturers of built-up lumber and in this form is a favorite with the vehicle makers as a body wood and with the trunk makers for trunk boxes, while in furniture making it serves as mirror backing and drawer bottoms, veneer boxes and other hidden parts of case goods. The implement makers find many places for this wood as lumber but the largest quantities go into boxes and crates and particularly for receptacles for shipping meats and other food stuffs. The wood is very light, soft, not strong, coarse-grained, liable to warp and is dark brown in color except the sapwood, which is nearly white. Like yellow poplar it is easily worked and takes paint well and in many uses, being cheaper, it is often substituted for it.

TABLE XXI. Cottonwood

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Boxes and crates	9,851,816	58.53	$24.04
Agricultural implements	4,805,000	28.55	38.94
Vehicles and vehicle parts	1,297,108	7.71	36.77
Car construction	302,000	1.79	32.55
Planing mill products	271 600	1.61	25.36
Sash, doors, blinds, and general millwork	130,000	.77	28.62
Refrigerators and kitchen cabinets	78,500	47	32.11
Fixtures	30,000	.18	40.83
Laundry appliances	30,000	.18	24.00
Dairymen's, poulterer's, and apiarists supplies	25,000	.15	25 00
Trunks and valises	10 000	.06	32.00
Total	16 831 024	100.00	$29.56

HACKBERRY

It is surprising that more hackberry was not reported by the Ohio manufacturers than is shown in this report. The tree ranges from New York to Idaho and from the Great Lakes to the Gulf of Mexico but it reaches its best development and is abundant in the Ohio and Mississippi Valleys. The largest specimens are found growing on the rich bottom lands. The wood is heavy and strong and is generally used for furniture, vehicles and agricultural implements, but in Ohio it was reported for saddle stirrups, boxes and flooring. It is sometimes sold mixed with ash.

TABLE XXII. Hackberry

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Boxes and crates	150,000	75.00	$14.00
Planing mill products	25,000	12.50	25.00
Saddles and harness	25 000	12.50	20.00
Total	200 000	100.00	$16 13

HEMLOCK

Twelve industries of this report demanded over 16,000,000 feet of hemlock in 1911. Table I shows that all but 100,000 feet came from the producing regions of other states. This is probably true as the hemlock tree grows only in certain restricted areas throughout Ohio, principally in the hilly country. Its principal use is for construction purposes as rough lumber and planing mill products like sheathing and roofing. In the country at large it follows yellow pine and white pine as a valuable wood for boxes and crates.

TABLE XXIII. Hemlock

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Planing mill products	13,675,000	84.60	$18.89
Boxes and crates	1,267,175	7.84	16.22
Machine construction	260,000	1.61	17.50
Caskets and coffins	200,000	1.55	11.35
Agricultural implements	207,000	1.28	16.22
Furniture	202,000	1.25	17.40
Ship and boat building	100,000	.62	30.00
Car construction	65,789	.41	16.66
Instruments, musical	48,000	.30	21.56
Patterns and flasks	30,000	.18	22.00
Sash, doors, blinds and general millwork	30,000	.18	21.67
Tanks and silos	30,000	.18	23.33
Total	16,164,964	100.00	$18.58

BLACK WILLOW

Black willow is not only abundant in Ohio but it attains large dimensions. It is usually found in wet situations, readily reproduces, and is one of the most rapidly growing of the native trees in the Ohio valley. The wood is light and soft, without figure, checks badly and is not in wide demand. Its chief uses are excelsior, boxes, artificial limbs, charcoal, wooden ware and fuel but in Ohio the makers of artificial limbs and boxes were the only industries reporting this wood.

TABLE XXIV. Black Willow

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Boxes and crates	150,000	88.24	$ 14.00
Miscellaneous	20,000	11.76	125.00
Total	170,000	100.00	$27.06

BUTTERNUT

Butternut is frequently found growing in Ohio usually associated with the beech, elms and maples. It is a species of walnut not infrequently called white walnut. The difference in size and shape of the rough shelled nuts from those of the black walnut easily distinguishes the tree. The butternut is elongated and smaller than the round black walnut. In the wood the color of the heartwood differentiates the two species; the butternut being a light gray-brown. The popularity of Circassian walnut, a foreign wood, for exterior of furniture, piano cases, store and office fixtures; gun stocks, interior finish, vehicle bodies, etc., has recently brought butternut into greater demand as much of the figured wood resembles that of Circassian walnut and therefore can be made to imitate it. The use of this wood in the following table, for patterns in foundry work and for boxes, is worthy of note.

TABLE XXV. Butternut

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Furniture	30,000	36.36	$35.00
Patterns and flasks	16,000	19.39	49.63
Vehicle and vehicle parts	10,000	12.12	45.00
Planing mill products	8,000	9.70	62.50
Boxes and crates	7,000	8.49	16.43
Instruments, musical	6,000	7.27	22.50
Machine construction	5,000	6.06	32.00
Sash, doors, blinds and general millwork	500	.61	70.00
Total	82,500	100.00	$39.26

LOCUST

Stands of honey locust (*Gleditsia triacanthos*) are occasionally found in Ohio. Black locust (*Robinia pseudacacia*), which botanically bears no relation to the former, is more important and more widely distributed. It is a rapid grower and therefore desirable and is being largely used in woodlot management. The wood generally is most widely used for fence posts and then for insulator pins and brackets. The vehicle makers call on it for hubs, the ship builders for kevels, bits and treenails, and Maxwell writes that infrequently the manufacturers turn it into police clubs, castor wheels, and parts of farm implements.

TABLE XXVI. Locust

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Vehicles and vehicle parts	10,000	83.33	$35.00
Boat and ship building	2 000	16.67	40.00
Total	12 000	100.00	$35.83

Fig. 11. Black locust development in Ohio nearly three feet in diameter, age about 80 years.

CEDARS

Two of the cedars shown in the report grow in Ohio. They are red cedar (*Juniperus virginiana*), and the white or arborvitae (*Thuja occidentalis*). The stand of the latter is limited and mostly to the northeastern part of the State where the growth is small and its occurrence infrequent. The red cedar ranges throughout the State. It too is generally a small tree except in the southern tier of counties where it develops large enough occasionally to be cut into lumber. A small quantity was reported as home grown but with that exception the supply of both of these woods come from other States. The best development and the largest supply of the red cedar is towards the south in Virginia, Tennessee and Missouri, and that of the arborvitae in northern Michigan, Wisconsin, and Canada. From the slim trunks of the arborvitae more than any other wood in the Lake and New England states, are cut fence posts, telephone poles and crossties. Red cedar in the south is the best for fence posts but its most valuable and exacting use is for pencils and to a less extent for caskets and coffins, utility boxes, furniture and wardrobe lining. Western red cedar (*Thuja plicata*) known as giant arborvitae abounds only in the Pacific northwestern states, and is different from the eastern cedars just described in that the trees grow very large. The wood resembles the southern red cedar and it is that species in the northwest that furnishes the cedar shingles that are marketed throughout all the states even in the east. The principal use of the wood in Ohio was first, ship building and then for cornice and porch work and cases in house construction. The superior durability of western red cedar like that of the other cedars mentioned in damp situations and in contact with the soil are, together with the characteristic cedar fragrance, their distinguishing features.

TABLE XXVII. Cedars

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Sash, doors, blinds and general millwork	1,046,540	43.45	$18.11
Planing mill products	345,000	14.32	20.18
Ship and boat building	335,660	13.94	40.09
Boxes and crates	199,400	8.28	13.04
Dairymen's poulterer's supplies	175,000	7.27	35.00
Cigar boxes	126,750	5.26	44.77
Furniture	105,000	4.36	46.43
Woodenware and novelties	50,000	2.08	18.00
Caskets and coffins	25,000	1.04	51.60
Total	2,408,350	100.00	$25.71

SPRUCE

Nine industries show the use of spruce lumber. The eastern wood is listed as spruce because in trade the spruces are not separated. That cut in the Lake states is mostly white spruce as the black spruce in that section is so small that it seldem grows large enough for lumber. The red spruce predominates in the Southern Appalachian region and in the New England states. Sitka spruce is a western tree abounding principally in Washington and Oregon. On account of the growing scarcity of the eastern woods it is finding more and more its way into the eastern markets. The Ohio piano makers use the largest amount of Sitka spruce reported for sounding boards.

TABLE XXVIII. Spruce

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Boxes and crates	1,758,750	48.80	$16.70
Matches	750,000	20 81	20.00
Instruments, musical	260,000	7.21	37.58
Sash, doors, blinds and general millwork	240,000	6.66	39.52
Planing mill products	210,000	5.83	16.97
Ship and boat building	166,000	4.61	36.02
Refrigerators and kitchen cabinets	153,000	4 25	37.05
Bungs and faucets	36,000	1.00	28.00
Car construction	30,000	.83	24.00
Total	3,603,750	100.00	$22.38

YELLOW PINES

There are four species of yellow pine demanded in large quantities by the wood using industries of Ohio. They are longleaf pine, shortleaf pine, loblolly pine, and pitch pine. Twenty-two different industries consume a total of 145,230 973 board feet. The manufacture of planing mill products alone uses over 42 percent of the total; sash, doors, blinds, and general mill work 21 percent; car construction over 13 percent; and boxes and crates over 9 percent. These four industries demand 124,789,000 board feet or 85 percent of the total. The remaining 15 percent is divided among 18 other industries in varied amounts. The average cost for all industries is $25.99 per thousand feet b. m. Only a very small percentage of the total yellow pine used was grown in the State probably not more than 100,000 board feet and that was all pitch pine. The other three species were shipped into the State from the South. The longleaf pine was used more for construction work while shortleaf pine and loblolly enters into the manufacture of planing mill products.

Loblolly pine probably comprises a larger percentage of the total than the returns show, since it is thrown on the market mixed with shortleaf. It is due to the confusion of the common names of species on the market that the information of the individual woods can not separated except by an arbitrary division.

TABLE XXIX. Yellow pines

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Planing mill products	61,444,594	42 31	$26.45
Sash, doors, blinds and general millwork	30,381,903	20.92	28 67
Car construction	19,361,640	13.33	27.08
Boxes and crates	13,590,713	9.35	15.22
Agricultural implements	9,903,500	6.82	28.16
Tanks and silos	5,994,000	4.13	24.70
Machine construction	1,064,351	.73	21.93
Vehicles and vehicle parts	819,000	.56	28.59
Refrigerators and kitchen cabinets	409,542	.28	30.18
Fixtures	407,000	.28	21.29
Pumps	323,230	.22	23.72
Laundry appliances	275,000	.19	30.00
Elevators	264,000	.18	19.68
Ship and boat boat building	247,500	.17	33 95
Dairymen's, poulterer's and apiarist's supplies	210,000	.15	16.25
Trunks and valises	200,000	.14	30 00
Patterns and flasks	130,000	.09	27.12
Pulleys and conveyors	80,000	.06	30.00
Frames and molding	50,000	.04	30.00
Miscellaneous	50,000	.04	22.50
Furniture	20,000	01	35.00
Instruments, musical	15,000	.01	24.00
Total	145,230,973	100.00	$25.99

CYPRESS

The cypress occupies swampy lands. It is found in its greatest abundance in the lowlands of Louisiana where it forms almost exclusive forests. In the other southern Mississippi Valley States and in the southeastern costal regions its frequent occurrence makes it an important lumbering tree, but in nowise as much so as in Louisiana. Wherever it has been planted in Ohio, it has shown remarkable development and is being recommended for planting operations. Large quantities each year are brought from the south to meet the demands of the manufacturers. Sixteen industries purchased this wood for innumerable uses. The available statistics are as follows:

TABLE XXX. Cypress

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Planing mill products	17,149,966	45.09	$37.98
Sash, doors, blinds and general millwork	11,217,796	29.49	39.30
Laundry appliances	3,084,000	8.10	28.78
Boxes and crates	2,824,308	7.42	19.46
Tanks and silos	1,730,000	4.55	49.70
Dairymen's, poulterer's and apiarists' supplies	1,035,000	2.73	26.74
Refrigerators and kitchen cabinets	342,000	.90	32.95
Woodenware and novelties	226,000	.59	18.12
Fixtures	151,000	.40	32.02
Car construction	80,000	.21	32.50
Machine construction	70,000	.18	47.86
Agricultural implements	50,500	.13	30.30
Ship and boat building	41,000	.11	57.32
Brushes	30,000	.08	60.00
Pumps	5,000	.01	40.00
Vehicle and vehicle parts	2,000	.01	75.00
Total	38,038,570	100.00	$36.33

Fig. 12. Cypress (*Taxodium distichum*) planted in 1860 in Hamilton county.

DOUGLAS FIR

Next to yellow pine more Douglas fir is cut in the United States than other lumber trees. Most of it is sawed in Washington and Oregon but also it abounds in California and the Rocky Mountain

states. The tree attains to great size. Comparatively a short time ago it was unknown to the Ohio manufacturers but its low price in the regions where it is produced and the excellent quality of its lumber opened a market for it in this State and in the states further east. In many ways its wood is similar to longleaf pine and in Ohio it competes with it and also with oak being eminently suited for construction purposes, for flooring and for inside finish. Nine industries report Douglas fir, the amounts and percent of each are as follows:

TABLE XXXI. Douglas Fir

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Planing mill products	3,170,000	54.47	$31.62
Sash, doors, blinds and general millwork	1,021,000	17.54	35.24
Agricultural implements	600,000	10.31	36.00
Ship and boat building	431,000	7.41	36.43
Machine construction	413,000	7.10	50.60
Laundry appliances	102,000	1.75	35.00
Car construction	32,733	.56	34.98
Instruments professional and scientific	30,000	.52	40.00
Instruments, musical	20,000	.34	45.00
Total	5,819,733	100.00	$34.60

SUGAR PINE

The sugar pine tree attains fairly large proportions. The height varies from 160 to 180 feet and the diameter from 4 to 7 feet. Like redwood it is found growing in only two states, California and Oregon, the greatest abundance is in the former, extending from the northern to the southern border on the sides of the Sierra Mountains. Botanically it bears no relation to western white pine and for that reason the statistics appear under a separate heading. In the wood sugar pine both as to appearance and qualities resembles the western white pine and the white pine from the Lake states and its uses are about the same. The making of sash, doors, blinds and general mill work demanded the largest amount of this wood in Ohio, equal to over 87 percent of all.

TABLE XXXII. Sugar pine

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Sash, doors, blinds and general millwork	4,726,891	87.34	$46.13
Planing mill products	515,000	9.52	46.10
Patterns and flasks	90,000	1.66	61.64
Agricultural implements	50,000	.92	30.00
Instruments, musical	15,000	.28	90.00
Instruments, professional and scientific	15,000	.28	60.00
Total	4 411 891	100.00	$46.45

REDWOOD

Redwood lumber is the product of one state, California. Sixty-seven mills reported cutting it and in the lumber cut for 1910 according to quantity produced it stands twelfth in the list. It is often called big tree owing to its great size, the diameter varying from 6 to 12 feet and the height between 180 to 270 feet. The wood is light, soft and fairly strong which with its even straight grain makes it easy to work. The color of the wood is light to dark red except the thin sapwood which is almost white. Its usefulness and popularity of redwood with the Ohio manufacturers is indicated in the following table:

TABLE XXXIII. Redwood

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Dairymen's, poulterer's and apiarists' supplies	518,000	59.13	$32.10
Planing mill products	180,000	20.55	41.06
Sash, doors, blinds and general millwork	75,000	8.56	36.00
Instruments, musical	33,000	3.77	50.00
Instrumental, professional and scientific	30,000	3.42	38.00
Tanks and silos	24,000	2.74	60.00
Miscellaneous	16,000	1.83	54.00
Total	876,000	100.00	$36.73

TAMARACK

Tamarack is occasionally found in Ohio growing in swamps. The wood is heavy, hard, very strong, coarse-grained, compact, and very durable. Color is light brown, and nearly white sapwood. It is used to some extent for fence material on account of being fairly durable, which also recommends its use for cross-ties. The box makers use all that was reported for this report.

FOREIGN WOODS

Foreign woods are usually shipped to this country in log form or in flitches and are manufactured here into lumber and veneer. They are high priced woods and serve principally in cabinet and furniture work on account of their handsome and durable finish. Mahogany is the principal one and annually the Ohio manufacturers use almost 5 million feet. This does not, however, include the large amount of mahogany veneer that each year is cut in this State and sold in that form. Like the domestic oaks there are many species of mahogany. The manufacturers usually take no account of the kind they buy nor do they concern themselves from what country the wood comes. In consequence a good deal of African and Philippine material is sold that is not real mahogany nor of the mahogany

family. The true mahoganies shipped to this country come from Mexico, West Indies, Central and South America. Mahogany is not only consumed in large amounts in Ohio but it is quite widely distributed among the industries as is shown in the following table:

TABLE XXXIV. Mahogany

Industry	Quantity used annually		Average cost per 1,000 ft.
	Feet b. m.	Percent	
Car construction	1,089,472	23.12	$109.12
Furniture	1,046,828	22.21	121.82
Planing mill products	845,000	17.93	143.35
Fixtures	643,364	13.65	142.54
Chairs	337,000	7.15	166.45
Sash, doors, blinds and general millwork	296,294	6.29	141.93
Instruments, musical	261,300	5.55	108.30
Caskets and coffins	60,000	1.27	83.58
Ship and boat building	49,000	1.04	108.16
Vehicles and vehicle parts	26,340	.56	138.83
Plumbers' woodwork	22,000	.47	143.64
Patterns and flasks	15,000	.32	141.34
Frames and molding	10,250	.22	115.02
Sporting and athletic goods	10,000	.21	100.00
Trunks and valises	500	.01	150.00
Total	4,712,348	100.00	$128.85

Spanish cedar in quantity, nearly one-half million feet, follows mahogany. Except a small amount reported for boat building all went to the cigar box manufacturers, the supply usually comes from Mexico, Central America, and the West Indies. It is a broad leaf tree in no way resembling our domestic cedars.

Circassian walnut was reported by six industries in varying small quantities. Owing to its high cost it was used principally in veneer. In 1911 more Circassian walnut veneer was cut in this country than ever before. It is a native tree of Russia, growing in the Circassian Mountains and in adjoining countries near the Black Sea.

Padouk is better known as vermillion wood and is so named from its natural bright red color. Like ebony and teakwood it is shipped from Oriental Countries.

English Oak is cut in the territory surrounding the Caspian Sea. It is the highest priced of any of the foreign woods reported by the Ohio manufacturers. Rosewood is a product of the forests of Central America and the northern States of South America.

INDUSTRIES

The various woods demanded by the Ohio manufacturers irrespective of their uses are listed and discussed on the preceding pages. The industries and the extent that they call for these different woods, their uses, and the qualities which make them valuable will next be considered. There are thirty-six industries in Ohio. The following table shows them in the order of the quality of wood they consume.

TABLE XXXV. Summary of woods by industries in Ohio

Industry	Quantity used annually		Av. cost per 1,000 feet	Total cost f. o. b. factory	Grown in Ohio ft. b. m.	Grown out of Ohio ft. b. m.
	Feet b. m.	Per-cent				
Planing mill products	249,296,495	27.24	$31.51	$ 7,854,691	22,772,780	226,523,715
Boxes and crates	153,417,273	16.76	16.89	2,591,034	15,990,577	137,426,696
Sash, doors, blinds and general millwork	110,447,792	12.07	35.32	3,901,146	7,932,000	102,515,792
Vehicle and vehicle parts	85,691,735	9.36	39.62	3,395,115	32,912,657	52,779,078
Car construction	56,200,885	6.14	31.69	1,780,986	17,730,496	38,470,389
Furniture	41,226,909	4.50	36.90	1,521,463	7,830,480	33,396,429
Agricultural implements	39,509,200	4.32	29.43	1,162,823	7,048,000	32,461,200
Handles	30,496,733	3.33	27.65	842,991	24,838,733	5,648,000
Matches	25,000,000	2.73	34.31	857,750	.....	25,000,000
Fixtures	13,974,448	1.53	41.28	576,800	5,186,979	8,787,479
Bungs and faucets	10,084,000	1.10	26.98	272,062	161,000	9,623,000
Dairymen's, poulterers' & apiarists' sup	9,771,000	1.07	25.94	253,422	3,338,000	6,433,000
Instruments, musical	8,583,100	.94	34.12	292,875	665,500	7,917,600
Tanks and silos	8,440,000	.92	33.45	282,293	200,000	8,240,000
Caskets and coffins	7,940,000	.87	26.42	209,740	460,000	7,480,000
Miscellaneous	7,749,350	.85	31.88	247,028	5,170,350	2,579,000
Woodenware and novelties (toys)	7,076,000	.77	22.82	161,440	3,276,000	3,800,000
Refrigerators and kitchen cabinets	5,757,900	.63	27.50	158,321	1,009,500	4,748,400
Chairs	5,333,500	.58	40.40	215,932	3,122,000	2,211,500
Machine construction	4,850,851	.53	30.01	145,560	2,106,500	2,744,351
Cigar boxes	4,733,186	.52	42.47	201,034	.....	4,733,186
Plumbers' woodwork	4,698,000	.51	30.56	143,555	630,000	4,068,000
Trunks and valises	4,187,340	.45	25.23	104,636	461,500	3,685,840
Laundry appliances	4,001,000	.44	29.24	117,000	65,000	3,936,000
Ship and boat building	3,322,660	.36	39.43	130,997	317,500	3,005,160
Frames and molding	2,809,961	.31	42.01	118,057	397,740	2,412,221
Brushes	2,697,111	.29	19.88	53,622	180,000	2,517,111
Pumps	1,656,230	.18	41.21	68,256	10,000	1,646,230
Patterns and flasks	1,469,200	.16	51.47	75,627	108,000	1,361,200
Equipment, playground	1,450,000	.16	15.31	22,200	325,000	1,125,000
Pulleys and conveyors	892,500	.10	28.84	22,166	242,500	650,000
Sporting and athletic goods	811,000	.09	66.39	53,840	55,000	756,000
Instruments, professional and scientific	604,000	.07	33.14	20,010	259,000	345,000
Elevators	588,000	.06	25.47	14,976	114,000	474,000
Saddles and harness	555,000	.06	27.73	15,388	358,000	297,000
Total	915,272,369	100.00	$30.47	$27,884,839	165,174,792	750,097,577

To maintain uniformity in the reports, the same classification is here followed that has been used in preparing similar reports for other States. Whenever more than three manufacturers in the State specialize in the making of a certain commodity, or closely related commodities, their specialty is classed as an industry. For instance, the cigar box manufacturers make one kind of container, the trunk manufacturers another, and the casket manufacturers, in their outer cases or rough boxes, still another. Instead of listing these several products as "Boxes," they are classified under separate titles. The same rule accounts for separating manufacture of chairs from furniture making, but in several cases the classifications run so closely together that a distinction is difficult to make. Because of this fact, an arbitrary division of the data was sometimes unavoidable. These cases will be pointed out later on under the discussion of the individual industry tables. In many cases, the information

given by a single manufacturer relates to the making of products listed under several different industries. This explains the frequent appearance in the directory of this report of the names of the same manufacturer under more than one industry heading. Several small industries, in which no more than two establishments reported, are grouped together under the caption "Miscellaneous."

Over $124,000,000 a year is paid by the Ohio wood users for their raw material. Less than 15 percent of this is paid for home-grown woods. This leaves more than $43,000,000 as the sum which Ohio thus pays out each year to other states. In not a few instances this purchase money is expended for material which might be produced in the State and will be if more of the people awake to the importance of a broader and more thorough application of the principles of forestry to the present timber stand in the State.

Ohio stands nineth in the list of States as to the amount of wood going into final form through the processes of manufacture. The following illustration shows the consumption and also production of rough lumber in the States in which studies similar to this have been completed, arranged in the order of the number of industries which indicates the diversity of manufactured wood products.

States	Consumption of rough lumber		Production of rough lumber, 1910
	Number of industries	Feet board measure	Feet board measure
Illinois	52	1,782,000,000	114,000,000
New York	49	1,740,000,000	506,000,000
Pennsylvania	42	1,800,000,000	1,241,000,000
Ohio	39	915,000,000	490,000,000
Michigan	37	1,283,000,000	1,681,000,000
California	35	662,000,000	1,255,000,000
Indiana	35	652,000,000	423,000,000
Virginia	29	895,000,000	1,652,000,000
New Hampshire	27	423,000,000	444,000,000
Connecticut	26	110,000,000	155,000,000
Missouri	26	443,000,000	502,000,000
New Jersey	25	256,000,000	37,000,000
North Carolina	25	676,000,000	1,825,000,000
Wisconsin	25	930,000,000	1,891,000,000
Massachusetts	24	550,000,000	239,000,000
Iowa	23	263,000,000	75,000,000
Minnesota	23	958,000,000	1,458,000,000
Alabama	22	727,000,000	1,466,000,000
Kentucky	22	410,000,000	754,000,000
Oregon	22	297,000,000	2,085,000,000
Maine	21	245,000,000	860,000,000
Tennessee	21	414,000,000	1,016,000,000
West Virginia	20	260,000,000	1,377,000,000
Washington	19	338,000,000	4,097,000,000
Georgia	18	555,000,000	1,042,000,000
Arkansas	17	1,361,000,000	1,844,000,000
Texas	17	762,000,000	1,884,000,000
Vermont	17	207,000,000	285,000,000
Oklahoma	15	28,000,000	165,000,000
Delaware	14	51,000,000	47,000,000
Maryland	14	284,000,000	155,000,000
Rhode Island	13	42,000,000	14,000,000
Louisiana	12	1,355,000,000	3,744,000,000
Mississippi	12	618,000,000	2,122,000,000
Florida	11	521,000,000	992,000,000
Montana	11	6,000,000	319,000,000
Kansas	10	61,000,000	1,000,000
Idaho	8	19,000,000	746,000,000
South Dakota	8	6,000,000	16,000,000

PLANING MILL PRODUCTS

In Ohio, as in other states, the output of the planing mills forms the largest percentage of lumber used by the various industries. Over a quarter of the total consumption in the State can be accounted for in this line, and the average price paid for the various woods ranks high above that of similar industries in other states.

There are but a few large sawmills in Ohio where, as in the southern states, planing mills are operated in connection, making flooring, ceiling, siding, stock, mouldings or finish, etc. A number of portable mills have planers, but as a rule their production is small and only for local consumption. The largest portion of the material represented by the following table has been taken from the reports of planing mills operating in cities and towns to the extent to which they manufacture the above named products, but the material used for general mill work turned out according to specifications or special orders has been listed under the industry called "sash, doors, blinds and general mill work."

The northern counties in Ohio bordering along the lakes, where the excellent water transportation from Canada and Wisconsin plays an important part, do not use southern pine for manufacturing building materials but substitute hemlock, Norway pine and white pine. In Cleveland and Toledo the large planing mills bring in these woods in the rough, put it through the machines and produce planing mill products shipped for sale in central Ohio, Indiana and Pennsylvania.

Further to the south in Ohio yellow pine soon enters into competition, until along the Ohio river very little white pine is used by the planing mills, except the higher grades, which find service for sash and doors. Norway pine was seldom reported in central and southern Ohio as in the market Norway is generally sold mixed with white pine. A large quantity of material, principally yellow pine, such as finish, flooring, siding, ceiling, etc., is manufactured in the south and shipped north ready for use. This stock was not included under this industry in Ohio but was accounted for in the report of the State where it was manufactured.

Owing to its durability cypress forms one of the principal woods used for siding, although white pine, especially in the northern parts of the State, ranks high for this purpose. Yellow poplar finish was formerly used extensively in this State, but the increasing price of this wood renders substitution necessary. Very little hardwood, such as beech, maple and oak, is manufactured into flooring in this State. Small quantities were reported by planing mills operated in connection with small sawmills, but most that is used in Ohio was brought from adjoining states already manufactured.

TABLE XXXVI. Planing mill products

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown our of Ohio Feet b. m
	Feet b. m.	Percent				
Yellow poplar	43,394,080	17.41	$ 31.71	$1,376,061	2,468,250	40,925,830
Longleaf pine	35,763,000	14.34	25.27	903,640	.....	35,763,000
White pine	33,696,393	13.52	35.53	1,197,226	.....	33,696,393
Shortleaf pine	25,666,594	10.30	28.10	721,161	.....	25,666,594
Red oak	20,591,856	8.26	37.84	779,097	7,728,000	12,863,856
Cypress	17,149,966	6.88	37.96	651,290	.....	17,149,966
White oak	16,402,826	6.58	40.83	669,718	6,043,750	10,359,076
Hemlock	13,675,000	5.49	18.89	258,385	.....	13,675,000
Norway pine	12,010,000	4.82	22.24	267,160	.....	12,010,000
Red gum	9,016,000	3.62	22.43	202,272	5,000	9,011,000
Sugar maple	5,622,910	2.25	28.00	157,460	1,983,910	3,639,000
Douglas fir	3,170,000	1.27	31.62	100,250	.....	3,170,000
Black walnut	2,103,500	.84	69.05	145,257	100,500	2,003,000
Birch	1,717,000	.69	36.79	63,170	26,000	1,691,000
Chestnut	1,413,000	.57	31.37	44,327	520,000	893,000
Beech	1,199,000	.48	21.67	25,980	929,000	270,000
Basswood	1,110,660	.44	26.68	29,630	719,660	391,000
White ash	924,100	.37	33.70	31,144	714,100	210,000
Mahogany	845,000	.34	143.35	121,130	....	845,000
White elm	548,260	.22	22.00	12,059	478,260	70,000
Sugar pine	515,000	.21	46.10	23,740	.....	515,000
Jack pine	400,000	.16	17.00	6,800	100,000	300,000
Sycamore	324,750	.13	25.72	8,354	274,750	50,000
Cottonwood	271,600	.11	25.36	6,888	101,600	170,000
Red cedar	270,000	.11	16.30	4,400	.....	270,000
Western white pine	251,000	.10	43.06	10,808	.....	251,000
Spruce	200,000	.08	16.07	3,213	.....	200,000
Silver maple	192,000	.08	24.48	4,700	152,000	40,000
Redwood	180,000	.07	41 06	7,390	.....	180,000
Hickory	178,000	.07	25.31	4,506	148,000	30,000
Black ash	125,000	.05	24.20	3,025	125,000	.....
Western yellow pine	125,000	.05	40.00	5,000	.....	125,000
Western red cedar	75,000	.03	34.00	2,550	.....	75,000
Cherry	62,000	.02	58.31	3,615	62,000	...
Bur oak	30,000	.01	37.00	1,110	25,000	5,000
Hackberry	25,000	.01	25.00	625	25,000	... .
Buckeye	20,000	.01	12.50	250	20,000	.....
Pitch pine	15,000	.01	30.00	450	15,000	.....
Sitka spruce	10,000	*	35.00	350	.....	10,000
Butternut	8,000	*	62.50	500	8,000	.....
Total	249,296,495	100.00	$31.51	$7,854,691	22,772,780	226,523,715

*Less than 1-100 of one percent.

BOXES AND CRATES

In nearly all other states box making stands near the head of the list of industries in the amount of material consumed. In Ohio, it is second, using over 150 million feet in 1911. It is interesting to note that in different parts of the State various woods predominate. In the northern portion white pine is more largely used, the central part reported cottonwood and shortleaf pine, while through the southern portion yellow poplar and shortleaf were called for in large quantities.

It is an admitted fact that there is a surplus of low-grade lumber in all parts of the country, and here is where the box industry plays such an important part in the closer utilization of wood. Grades of lumber that could be used in no other way find their places in boxes and cratings.

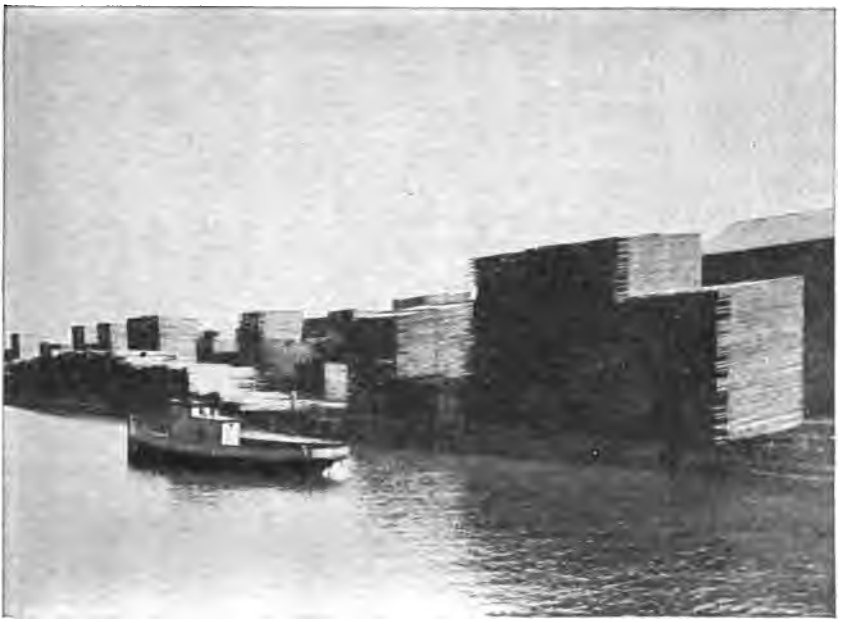


Fig. 13. A lumber wharf on Lake Erie showing the white pine and hardwoods that are shipped from the Lake States and Canada to northern Ohio to be manufactured into planing mill products.

It should not be understood in reviewing the table that most of the lumber reported under this head enters into box manufacture. An equal amount, if not more, is required for crating purposes. There has been a tendency within the past few years to crate practically everything, whether infrangible or not. Even construction stone, stoves and ranges and some steel girders are frequently crated. The carriage builders require large amounts of lumber annually for this purpose; sheet steel and tin plate are marketed in wood crates, and the furniture factories, even those making a cheap article, have given up the old method of wrapping the furniture in burlap and excelsior pads for the improved system of crating.

Fig. 14. A nailing machine of an Ohio box maker.

Yellow poplar and white pine surpass all other woods in furnishing a supply for this industry, the two composing 58 percent of the total. The large amount of yellow poplar employed can be accounted for in the fact that the states bordering on the Ohio valley constitute the yellow poplar center of the country. Freight rates prohibit the shipment of this low-grade material to any great distance, hence it must be utilized near the producing markets. While perhaps in some respects not as well suited for certain kinds of boxes as one or two of the other 35 woods reported, yellow poplar can nevertheless be classed generally as an excellent box and crating lumber. It is light in weight and color, and strong, nails well, and is odorless and tasteless if needed for containers requiring those qualities, low grades being used, its price is still within the limit of this class of work.

White pine has long been one of the leading box woods, and owing to Ohio's accessibility by water to the white pine forests it is used in numerous industries that would perhaps employ other woods if the price were higher. This wood enters largely into boxes of all kinds, particularly those intended for food containers like locked cornered starch and confectionary boxes where woods of odorless and tasteless qualities are demanded. White pine is well suited for printed matter since it dresses smooth and white. The entire amount used was obtained without the State.

Shortleaf pine, beech and elm make excellent woods for crating purposes. The two latter are obtained partly in the State, the remainder coming from adjoining states. They answer with the hardwoods, oak, ash, chestnut, etc., for purposes where a strong wood is needed and one difficult to split, like the boxes in which steel plate and tin plate are shipped, and where the weight of the wood is not a considerable factor. Cherry and butternut are employed only in small amounts and for the manufacture of special boxes, such as are required for jewelry and silverware.

Most of the material is obtained in 4-4 inch stock, but some is bought in 1-2, 5-8 and 3-4 inch lumber. For the wire-bound box, which is rapidly coming into use, thin stock is required, ranging from 1-8 inch to 1-2 inch in thickness. Red gum and cottonwood furnishes the bulk of the supply of veneer for veneer boxes. Veneer boxes are made not only with a single layer and wire-bound, but of two and three-ply stock according to the size of the box and the use for which it is intended.

TABLE XXXVII. Boxes and crates

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
Yellow poplar	38,779,666	25.28	$15.94	$618,100	2,984,000	35,795,666
White pine	35,896,790	23.40	16.60	595,824	.....	35,896,790
Shortleaf pine	11,429,613	7.45	14.97	171,073	.....	11,429,613
Cottonwood	9,851,816	6.42	24.04	236,880	25,000	9,826,816
Beech	7,338,629	4.78	14.24	104,501	1,622,616	5,716,013
White elm	7,074,109	4.61	24.35	172,232	4,666,552	2,407,557
Chestnut	6,343,739	4.13	13.85	87,834	356,739	5,987,000
Silver maple	6,094,795	3.97	13.75	83,827	1,350,000	4,744,795
Red gum	5,623,025	3.67	17.06	95,928	165,232	5,457,793
Red oak	4,468,945	2.91	14.76	65,978	819,837	3,649,108
Basswood	4,333,000	2.82	20.13	87,231	1,318,000	3,015,000
Cypress	2,824,308	1.84	19.46	54,972	.....	2,824,308
Sugar maple	1,912,601	1.25	17.36	33,198	807,601	1,105,000
Spruce	1,758,750	1.15	16.70	29,365	.....	1,758,750
White oak	1,731,000	1.13	15.35	26,567	336,000	1,395,000
Longleaf pine	1,702,100	1.11	16.11	27,418	.....	1,702,100
Hemlock	1,267,175	.83	16.22	20,548	100,000	1,167,175
Birch	765,000	.50	14.10	10,785	20,000	745,000
Balm of Gilead	688,820	.45	17.13	11,800	.....	688,820
Black gum	660,000	.43	16.55	10,920	300,000	360,000
Tamarack	600,000	.39	17.00	10,200	.....	600,000
Buckeye	561,992	.37	14.36	8,069	299,000	262,992
Loblolly pine	449,000	.29	18.32	8,225	.....	449,000
Sycamore	200,000	.13	14.25	2,850	200,000	.....
Red cedar	199,400	.13	13 04	2,600	.....	199,400
Cotton gum	190,000	.12	18 42	3,500	.....	190,000
Black ash	155,000	.10	14.35	2,225	155,000	.....
Hackberry	150,000	.10	14.00	2,100	150,000	.....
Willow	150,000	.10	14.00	2,100	150,000	.....
Hickory	105,000	.07	24.52	2,575	105,000	.....
Jack pine	53,000	.03	13 58	720	.....	53,000
White ash	25,000	.02	17.20	430	25,000	.....
Cucumber	20,000	.01	7.00	140	20,000	.....
Cherry	8,000	.01	25.50	204	8,000	.....
Butternut	7,000	*	16.43	115	7,000	.....
Total	153,417,273	100.00	$16.89	2,591,034	15,990,577	137,426,696

*Less than 1-100 of 1 percent.

SASH, DOORS AND MILL WORK

Allied so closely with this industry that it is often difficult to distinguish between them, are the products classified under planing mills and those grouped under fixtures. Planing mill products are the more universal commodities which are kept in stock, such as flooring, siding, ceiling, stock, moulding, etc. Under fixtures higher priced woods including many expensive cabinet woods are utilized for specific purposes like show cases and other movable furnishings not considered furniture, while the sash, door, etc., industry includes sash, doors, frames, blinds, stairwork, built-in cupboards, mantels, colonnades, grills, panels, wainscoting and all exterior and interior finish worked according to special designs. From the average price reported for the wood used it is evident that material required for the products of this industry are the upper grades. Within recent years the establishment of factories specializing in sash and door

manufacture has already induced the general planing mill located, as in Ohio, in nearly every city and town to abandon the making of these products because they can be bought in the open market more advantageously than they can be manufactured in small quantities. Many of the operators grouped under this industry, therefore, make sash, doors and blinds only in special sizes, while most of the material they used went for building purposes, known in trade as general mill work. The tendency to manufacture building materials close to the source of supply of raw material, in other words, close to the sawmills, is largely on the increase and it is well inasmuch as it undoubtedly makes for economy for all concerned, including the consumer. The available statistics showing the kinds of wood used in the order of their importance as to quantity are presented in the following table.

TABLE XXXVIII. Sash, doors, blinds and general mill work

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
Shortleaf pine	22,616,217	20.48	$29.05	$ 656,938	.....	22,616,217
Yellow poplar	20,324,206	18.40	35.36	724,781	1,075,000	19,249,206
White pine	14,613,500	13.23	37.20	543,598	.....	14,613,500
Cypress	11,217,796	10.16	39.30	440,894	.....	11,217,796
White oak	8,640,697	7.82	43.48	375,980	2 954 500	5,686,197
Longleaf pine	7,765,686	7.03	27.56	213,996	.....	7,765,686
Red oak	5,918,000	5.36	39.05	231.114	2,496,000	3,422,000
Sugar pine	4,726,891	4.28	46.13	218,359	.....	4,726,891
Norway pine	3,950,000	3.58	25.00	98,750	.....	3,950,000
Birch	1,918,990	1.74	43.19	82,883	92,000	1 826,990
Chestnut	1,581,475	1.43	29 51	46,660	245,000	1,336,475
Basswood	1,140,000	1.03	27.66	31,536	521,000	619,000
Douglas fir	1,021,000	.93	35.24	35,985	.....	1,021,000
Red gum	1,006,000	.91	32.29	31,307	.....	1,006,000
Northern white cedar	783,540	.71	13.17	10,317	.....	783 540
Beech	500,000	.45	19.76	9,880	50,000	450,000
Sugar maple	460,000	.42	33.24	15,292	174,000	286 000
Western white pine	409,000	.37	52.66	21,536	.....	409 000
Mahogany	296,294	.27	141.93	42,054	.....	296,294
White ash	289,000	.26	44.89	12,972	142,000	147,000
Western yellow pine	275,000	.25	46.73	12,850	.....	275,000
Spruce	240,000	.22	39 52	9,485	.....	240,000
Western red cedar	200,000	.18	32.00	6,400	.....	200,000
Cottonwood	130,000	.12	28.62	3,720	35,000	95,000
Redwood	75,000	.07	36.00	2,700	.....	75,000
Red cedar	63,000	06	35.29	2,223	.....	63,000
Sycamore	62,500	.06	38.43	2,402	39,500	23,000
Black walnut	54,000	.05	51.57	2,785	44,000	10,000
Cherry	46,500	.04	50.32	2 340	23 500	23,000
Silver maple	33,000	.03	20.15	665	30,000	3,000
Hemlock	30,000	.03	21.67	650	.....	30,000
White elm	25,000	.02	22.48	562	10,000	15,000
Circassian walnut	15,000	.01	333 33	5,000	.....	15,000
English oak	10,000	*	410.00	4 100	.....	10,000
Hickory	10,000	*	40.00	400	....	10,000
Butternut	500	*	70.00	35	500	.....
Total	110 447 792	100.00	$35.32	$3 901 149	7,932,000	102 515,792

*Less than 1-100 of one percent.

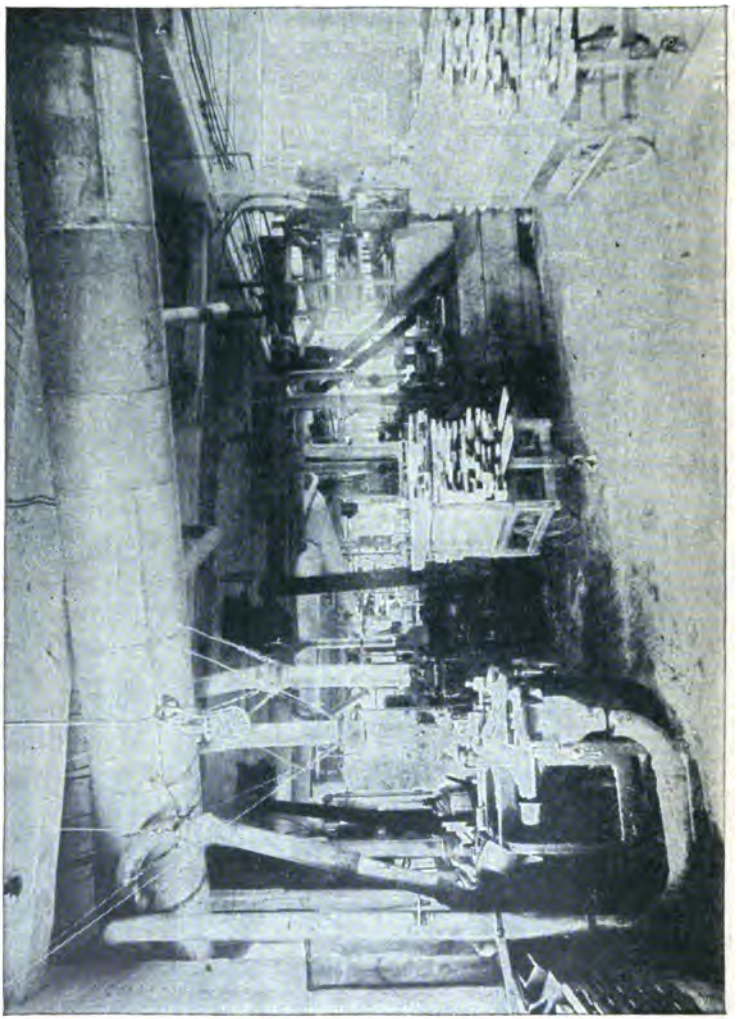


Fig. 15. Interior view of factories listed as sash and doors and general mill work.

VEHICLES AND PARTS

In contrast with the rapid increase in the automobile industry there has probably been a decline in the consumption of wood for the manufacture of horse-drawn vehicles, and a number of firms priorly specializing in building buggies and wagons have added to their business the making of auto-vehicles, either pleasure cars or commercial trucks. The change has not materially affected the relative standing of the manufacture of horse-drawn vehicles as this industry is still a very important line of manufacturing in the State and in the number of vehicles turned out is one in which Ohio leads all other States.

It was deemed advisable in segregating the industries to include vehicle "parts" under this table, since some firms devote their entire plant and equipment to the manufacture of component parts, such as spokes, rims, hubs and poles. Often carriage manufacturers are practically nothing more than assemblers of parts and enter into production merely as finishers. The southern States, with their comparatively large supplies of hickory and oak, the two important woods of this line of manufacture, are the sources of the main supply. Club turned spokes, rim strips, and gear woods, partly finished, are shipped into Ohio in large quantities from this section. These semi-finished products were not taken into account when collecting information for this report since the wood used has already been or will be credited to the States producing them. Likewise it was impractical in collecting statistics for this report to include materials used by the small wheelwright or country blacksmith, who in the aggregate would not consume a great amount and generally buys what he does use in a partly finished condition.

The large amount of hickory consumed, mainly, 29,324,100 feet, indicates that it is the premier wood in vehicle making. Its use is confined mainly to the production of spokes and bent rims for buggy wheels, and to a large extent for gear parts. In the manufacture of heavy wagons white and red oak, the latter to a much less extent, have been the favorite woods. They answer for felloes, hubs, spokes, axles, hounds, bolsters, poles, etc., and are the standard wagon-woods of the country. Mortised wagon hubs are largely made of elm, both white and rock, and woods for gear parts other than the hickories and oaks are sugar maple, white ash, beech, black locust, etc.

Yellow poplar, which comes third in the list, indicates the high grades of this class of manufacture, since only the best carriages, delivery wagons and automobiles could afford this wood, on acconnt of the high prices demanded. Formerly yellow poplar was used for

wagon boards, but of late years it has been replaced with cotton wood, red gum and yellow pine. It is the principal paint wood for fine vehicle bodies and in the early stages of automobile manufacture was almost entirely the only material used for limousine and other style motor car bodies. Its affinity for paint and capacity for taking a high polish, together with its width and clear grades gave it the preference over other woods. Manufacturers of bodies, which is practically a distinct industry, now report that metal has almost entirely supplanted wood in this respect, being more satisfactory because the hidden defects of the former are apt to show with each change of temperature. Ash and maple are generally used for body frames, where great strength is required. All of the richer cabinet woods reported were employed by the automobile maker, the windshield and steering wheel especially requiring woods of beautiful grain and capable of high finish.

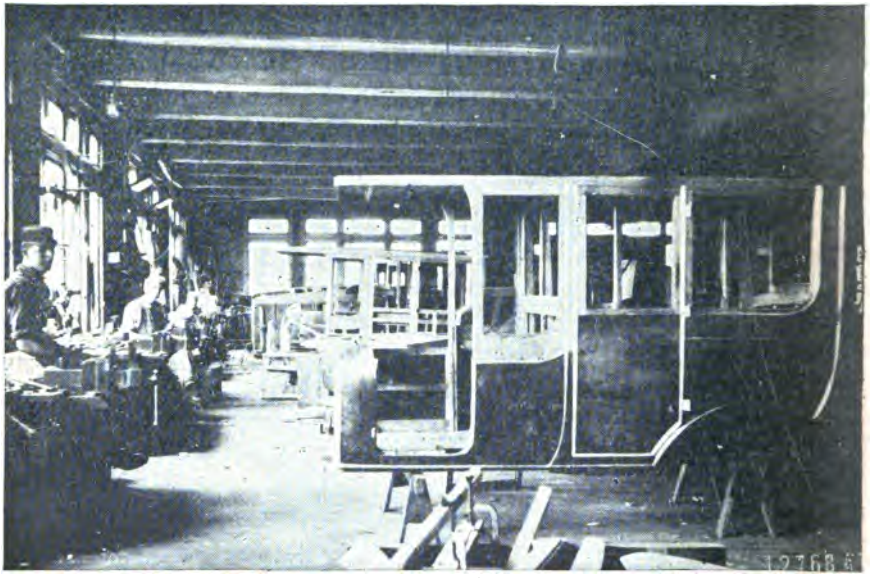


Fig. 16. A small carriage maker who has converted his business to making automobile bodies.

Beech is largely used for the felloes of heavy vehicles, and a considerable amount is noted; but all of this wood does not enter into felloes; indeed the larger part of it is converted into wheelbarrows. Although beech is a strong and stiff wood and wears well and long, it is more likely to break under a sudden jar or strain than white oak.

White oak is preferred for skeined axles. Red oak and sugar

maple are also used but some object to maple because it is said that where the iron skein is clamped to maple the axle will not last as long as with the oaks, owing to dry rot caused by contact with the metal. In many parts of the country steel axles are replacing oak, this being especially true in the Mississippi valley and eastern states. Statistics show that this change has been very rapid, having reached an average of about seventy-five percent during the past decade. The average cost of the steel axle is about $10 per set more than wood.

Besides wagons, carriages and automobiles, there are included under this industry such vehicles as warehouse trucks, push carts, sleighs and cutters; but it is unnecessary to mention in detail the woods that enter into their manufacture, because the requirements are the same as for other vehicles. No doubt not a little of the hard maple reported is utilized for bobsleds and cutter sleighs, owing to its strength and rigidity, as well as its lower price.

TABLE XXXIX, Vehicles and vehicle parts

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
Hickory	29,324,100	34.22	$ 44.34	$1,300,352	8,271,400	21,052,700
White oak	19,701,012	22.99	37.07	730,335	9,925,000	9,776,012
Yellow poplar	8,918,884	10.41	52.92	471,987	414,000	8,504,884
White ash	6,182,841	7.22	43.81	270,847	2,367,000	3,815,841
Cork elm	6,083,570	7.10	17.55	106,791	5,668,570	415,000
Red oak	2,556,000	2.98	35.33	90,315	1,678,000	878,000
Sugar maple	2,518,081	2.94	44.00	110,801	939,500	1,578,581
Beech	2,260,000	2.64	19.70	44,530	755,000	1,505,000
Red gum	1,633,064	1.91	26.09	42,612	14,187	1,618,877
Black ash	1,603,987	1.87	39.08	62,682	992,000	611,987
Cottonwood	1,297,108	1.51	36.77	47,700	22,000	1,275,108
White elm	1,201,308	1.40	22.66	27,218	1,090,000	111,308
Bur oak	605,000	.71	41.94	25,375	573,000	32,000
Longleaf pine	587,000	.69	28.46	16,704	.....	587,000
Basswood	427,000	.50	28.53	12,183	159,000	268,000
Birch	358,000	.42	43.55	15,591	.....	358,000
Shortleaf pine	232,000	.27	28.92	6,710	.....	232,000
Black walnut	80,850	.10	50.06	4,047	13,000	67,850
Mahogany	26,340	.03	138.83	3,657	.....	26,340
Chestnut	25,000	.03	48.00	1,200	.....	25,000
Silver maple	18,620	.02	30.93	576	.....	18 620
Cherry	12,000	.01	62 50	750	12,000	.....
White pine	10,800	.01	39 63	428	.....	10,800
Locust	10,000	.01	35.00	350	5,000	5,000
Butternut	10,000	.01	45.00	450	10,000	.....
Sycamore	4,000	*	35.00	140	4,000	.....
Circassian walnut	3,170	*	200 00	634	.....	3,170
Cypress	2,000	*	75.00	150	.....	2,000
Total	85,691,735	100.00	$39.62	$3,395,115	32,912,657	52,779,078

*Less than 1-100 of one percent.

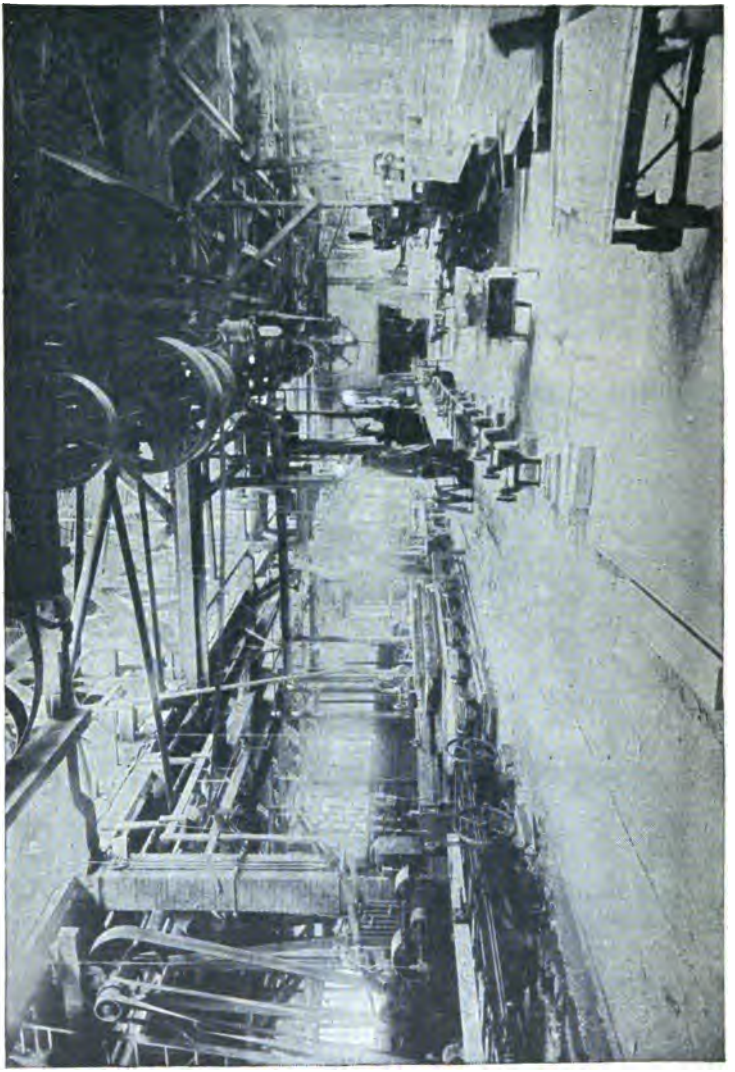


Fig. 17. Showing the importance of wood-working machinery in building freight cars.

CAR CONSTRUCTION

Ohio, with its vast network of railroads and trolley lines, is an advantageous location for car building industries. As indicated, however, in table following, the manufacture of high-class cars, such as parlor, sleeping, diners and observation cars, which require expensive cabinet woods, is not a factor of this industry. To the contrary, the material reported goes largely into building and repairing freight cars, locomotive cabs and pilots, passenger coaches and the building of electric cars for street railway and interurban service. Grain door material is included in this table and lumber demanded for the construction of mine cars and contractors' dump cars.

In Ohio as in most of the other States already studied for wood consumption, longleaf pine heads the list of woods in quantity for car building. It meets many uses but principally for structural parts where great strength is required like sills, brake beams, body posts, dead blocks, bolsters, plates, draft timbers, etc., and in this respect is a competitor of red and white oak and Douglas fir. Douglas fir, possessing qualities similar in strength, durability and adaptability, to the other woods for car building, is consumed only to a limited extent, owing to its relatively higher price delivered to Ohio points. If there is a reduction in the rate of transportation possible after the opening of the Panama Canal, it may lessen the price and bring Douglas fir, which is already held in high favor, into greater prominence in Ohio and other eastern markets. This wood is not only suitable for framing and other parts of freight cars but for interior finish of passenger and trolley cars where the high polish it takes and its conspicuous figure make it sufficiently ornamental to be used for this purpose. The finish woods reported by Ohio car builders are white ash, red oak, white oak, red gum, mahogany, birch and cherry, also padouk and black walnut in small quantities. Shortleaf pine, longleaf, Norway pine and cypress were used mainly in the superstructure of box cars. They supplied the material for carline, ridge poles, roof ribs, belt rails, outer sheathing or siding, lining, inside roof, roof boards and many other parts of both passenger and freight cars. Yellow poplar meets many uses for interior work of passenger cars but its chiefest use, with limited quantities of cottonwood and basswood, is for outside panel work.

TABLE XL. Car construction

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio	Grown out of Ohio
	Feet b. m.	Percent			Feet b. m.	Feet b. m.
Longleaf pine	16,599,615	29.54	$ 27.33	$453,710	.....	16,599,615
White oak	13,404,535	23.85	28.31	379,459	10,312,705	3,091,830
Red oak	8,481,757	15.09	23.25	197,193	6,114,344	2,367,413
Yellow poplar	4,598,715	8.18	43.50	200,030	5,496	4,593,219
White pine	3,629,322	6.46	32.29	117,206	.....	3,629,322
Shortleaf pine	2,762,025	4.91	25.35	70,028	.....	2,762,025
White ash	2,450,700	4.36	47.83	117,219	725,676	1,725,024
Mahogany	1,089,472	1.94	109.12	118,887	.....	1,089,472
Norway pine	629,417	1.12	23.42	14,742	.....	629,417
Cherry	613,581	1.09	76.24	46,782	56,799	556,782
Sugar maple	517,295	.92	34.18	17,679	120,766	396,529
Cottonwood	302,000	.54	32.55	9,830	2,000	300,000
Bur oak	220,000	.39	30.73	6,760	220,000	.....
Western larch	213,000	.38	22.50	4,792	.....	213,000
Basswood	177,982	.32	27.91	4,968	132,232	45,750
Black ash	129,000	.23	65.00	8,385	.....	129,000
Cypress	80,000	.14	32.50	2,600	.....	80,000
Hemlock	65,789	.12	16.66	1,096	.....	65,789
Birch	54,927	.10	39.67	2,179	.....	54,927
Chestnut	52,224	.09	24.09	1,258	12,024	40,200
Douglas fir	32,733	.06	34.98	1,145	.....	32,733
Spruce	30,000	.05	24.00	720	.....	30,000
Hickory	18,296	.03	36.13	661	10,254	8,042
Padouk	14,000	.02	125.00	1,750	.....	14,000
White elm	12,000	.02	40.00	480	5,000	7,000
Black walnut	9,000	.02	90.00	810	9,000	.....
Red gum	8,000	.01	26.00	208	.....	8,000
Beech	4,200	.01	20.00	84	4,200	.....
Circassian walnut	1,300	*	250.00	325	.....	1,300
Total	56,200,885	100.00	$ 31.69	$1,780,986	17,730,496	38,470,389

*Less than 1-100 of one percent.

FURNITURE

The manufacture of furniture is one of the oldest industries in the State, and at the same time one of the most important, twenty-seven woods being required to meet the demand. Chairs and kitchen cabinets are not a part of this industry, but have been considered under separate classifications. Commodities grouped in the following table are bedroom furnishings, chiffoniers and bureaus, dining tables and buffets, parlor outfits, including frames for upholstered furniture, hall racks, desks, china closets and bookcases. Many of the woods reported are used only in parts that are not visible, such as cores for veneering, frames, and brackets and table slides. In such places beauty of finish is not required, and the cheaper woods are employed. The other woods are selected for show and must be of high grade without defect, having a pleasing figure and capable of polish. The use of veneer in this line of manufacture and the artful staining of inferior woods enable the furniture makers to turn out the attractive products at much lower prices than they could otherwise afford. Indeed it is a rare occasion when the expensive woods,

such as mahogany, Circassian walnut and black walnut are used in solid pieces. Veneer is bought from the veneer mills in surface measure, the sheets ranging from 1-24 inch to 1-8 inch in thickness. As a rule, the expensive foreign woods are obtained in the former thickness. Cores, or the backing to which veneer is glued, are made of solid lumber or built-up lumber. The latter is purchased already made built of several layers of cheap veneers glued with the grains transversing. Built-up lumber is rapidly growing in favor everywhere with furniture makers. It has the qualities of not warping and being light with exceptional strength.

In Ohio white oak is the principal furniture wood and next to it red oak, which furnishes about one-half as much as white oak. With these two, over 52 percent of the total of the furniture material can be accounted for. A large amount of the oak reported is quartered oak, for this industry absorbs the largest amount of quartered stock reported by any other class of manufacture in Ohio. It costs considerably more than the plain sawed oak, owing to the fact that only prime logs are used, the waste in quarter sawing is greater, and more skilled labor and time are required in producing it. The enhanced beauty of quarter-sawed wood is due to figures and waves of the grain caused by sawing tangentially across the medullary rays.

Sugar maple and yellow poplar are employed in about equal amounts. Part of the maple is required for the outside or finish, especially the bird's-eye or mottled wood, but the main portion is made into drawer sides and bottoms, couch frames, table slides, tops, legs, etc. Yellow poplar, although greatly in demand for backing, the bottoms of drawers and coring, is used also for the exterior of furniture in painted or enameled work.

Red gum is of great service in two ways, now that the difficulties of seasoning the wood have been fairly well overcome, which heretofore prevented its extensive use. It goes, like yellow poplar, into hidden work and besides is a favorite wood for finish, either in natural color, where sometimes its richly mottled wood resembles Circassian walnut, or it can be stained so as to be a close imitation of mahogany and other cabinet woods. It is not uncommon for furniture makers to call products made from red gum resembling Circassian walnut hazel wood. The idea of giving new names to this wood likely originated abroad, where it is called satin walnut and where it was used for cabinet work before its adaptability was considered in this country.

Hemlock and buckeye went for backs of case goods and drawer sides, but were reported only in small quantities. Basswood was the favorite for interior work, especially shelving, and it also served

for matress frames, bed slats and table rails. Chestnut was the chief wood for veneer backing, serving for tops of tables and case goods, drawer fronts and other panel work. Parlor furniture frames were made from sugar maple, birch, ash and mahogany, while davenport and couch frames were of yellow pine, maple, red gum, yellow poplar and oak. Black walnut answered for wardrobes and bedsteads. The large amount of mahogany indicates the popularity of this finish. It was reported to a large extent as veneer.

TABLE XLI. Furniture

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
White oak	15,704,962	38.09	$ 40.84	$ 641,452	4,084,381	11,620,601
Red oak	7,415,059	17.99	39.86	295,550	1,311,000	6,104,059
Sugar maple	3,603,400	8.74	26.72	96,298	1,000,000	2,603,400
Yellow poplar	3,086,703	7.49	30.43	93,930	202,000	2,884,703
Red gum	2,766,300	6.71	25.21	69,751	.....	2,766,300
Chestnut	2,257,100	5.48	20.92	47,219	201,500	2,055,600
Basswood	1,558,500	3.78	27.13	42,285	663,500	895,000
Mahogany	1,046,828	2.54	121.82	127,524	.....	1,046,828
Silver maple	922,801	2.24	27.35	25,239	172,101	750,700
Birch	876,996	2.13	30.82	27,032	30,898	846,098
White elm	870,000	2.11	26.02	22,640	85,000	785,000
White ash	274,640	.67	25.03	6,874	.....	274,640
Hemlock	202,000	.49	17.40	3,514	.....	202,000
Cotton gum	150,000	.36	16.00	2,400	.....	150,000
Red cedar	105,000	.25	46.43	4,875	.....	105,000
Hickory	103,000	.25	24.68	2,542	1,000	102,000
Beech	95,000	.23	20.79	1,975	20,000	75,000
Buckeye	60,000	.15	35.00	2,100	.....	60,000
Black walnut	50,900	.12	67.88	3,455	23,400	27,500
Butternut	30,000	.07	35.00	1,050	30,000	.....
Shortleaf pine	20,000	.05	35.00	700	....	20,000
Sycamore	15,000	.04	35.00	525	.....	15,000
Cherry	5,700	.01	89.12	508	5,700	.....
Circassian walnut	5,500	.01	281.82	1,550	.....	5,500
Ebony	500	*	240.00	120	.....	500
Rosewood	500	*	350 00	175	.....	500
Padouk	500	*	360.00	180	.....	500
Total	41,226,909	100.00	$ 36.90	$1,521,463	7,830,480	33,396,429

*Less than 1-100 of one percent.

AGRICULTURAL IMPLEMENTS

Ohio is one of the leading agricultural states, and with the propaganda of scientific farming gaining converts each year the use of agricultural implements in place of the old makeshift methods of farming has greatly advanced. The growing cost and scarcity of farm labor has aided in this industry. Ohio is now among the foremost in this manufacture, consuming 38,659,200 board feet annually. All kinds of farm machinery are produced, from a threshing machine to a hand hay rake. Such implements as hoes, pitchforks, garden rakes, etc., have been excluded because they consume wood only for handles and this material has been considered under Table XXVI.

Twenty-seven woods were employed for implements, of which more than four-fifths were shipped into the State, the home market supplying only 6,488,000 board feet. The tendency to substitute metal for wood in this line of manufacture is growing rapidly. Some implements are entirely of steel where formerly they were mostly of wood. Plows, whiffle and singletrees, horse rakes and eveners are examples. Shortleaf and longleaf pine, red and white oak, cottonwood, maple, hickory, yellow poplar and basswood are the main woods employed, and the average cost, $29.30, signifies that a fairly high grade of lumber is used. This is the only industry in which red oak is employed in greater amounts than white oak. These two woods are used in larger quantities than any other two, furnishing over one-fourth of the total. The strength and hardness of these woods render them most important and they enter into a variety of uses.

Shortleaf and longleaf pine, which comprise nearly one-quarter of the total, are almost ideal material for farm implement manufacture. They are lacking in toughness, which unfits them for certain purposes, but next to the oaks they are demanded ahead of any other woods.

Cottonwood, basswood, red gum and yellow poplar are well suited, like the pines and maples, for certain parts. Their weight in proportion to strength, ease of working, and the fact that they take paint readily, make them well liked. The use of yellow poplar is decreasing, however, because the manufacturers cannot afford to pay the price for the grades desired. Red gum and cottonwood are the principal substitutes.

Where hardness or the quality to wear smooth is desired, maple and beech are used. Ash was employed largely in competition with oak, while hickory entered into parts where elasticity with shock resisting and strength tendencies were demanded. Six hundred thousand feet of Douglas fir were used by the implement makers. This wood has all the desirable qualities of longleaf pine and is a strong competitor of it in every way except price, which, on account of the freight rates, is much higher. The uses of the various woods reported by the implement makers are as follows:

ASH

Animal pokes
Cider mill cylinders
Cultivator beams
Hand corn planters
Handles (drill plow)
Handles (cultivator)
Handles (scraper)
Rake heads
Separator parts
Threshing machine parts

BASSWOOD

Fans (bodies)
Frames (fan screen and hopper)
Seed huller parts
Slats (fan mills)
Threshing machine parts

BEECH

Braces (wheelbarrow)
Ensilage cutters
Frames (sheller)
Handles (wheelbarrow)
Handles (scraper)
Neck yokes
Posts (cider mill, corn sheller, feed cutter)
Sills (fan mills)
Wheelbarrow sides

CHESTNUT

Levers (feed grinder)
Posts (cider mill, corn sheller, feed cutter)
Tables (feed cutter)

COTTONWOOD

Ensilage cutters
Fan mill boxes
Feed boxes
Grain drill hoppers
Swath boards
Wheelbarrow sides

CUCUMBER

Hay rack beams

CYPRESS

Separator (interior parts)
Threshing machine (interior parts)

ELM

Feed cutters
Frames (wheelbarrow)
Handles (scraper)
Platforms (reaper and mower)
Rollers for mowers
Separator or threshing machinery parts

RED GUM

Beater bars
Divider boards
Paddles (manure spreader)
Tables (manure spreader)
Rye dividers

HEMLOCK

Potato sorter parts

HICKORY

Doubletrees
Eveners
Hitches
Huller parts
Levers
Pitman's mowers
Pitman's threshers
Revolving horse rakes
Shaft bars
Separator parts
Silage cutter parts
Singletrees
Teeth (hand rake)
Tongues
Wagon jacks

MAPLE

Beds (manure spreader)
Doubletrees
Eveners (harrow)
Feeder cutters
Frames (cleaner)
Frames (ensilage cutter)
Frames (manure spreader)
Frames (pulley)
Frames (sheller)
Frames (wheelbarrow)
Hand corn planters
Corn huller boxes
Legs (fan mills)
Neck yokes
Poles (mower, reaper, binder)
Poles (cultivator)
Posts (cider mill)
Posts (corn sheller)
Rakes
Rakes (revolving hay)
Separators (interior parts)
Frames
Singletrees
Sling sticks
Stubs
Swath boards (binders and mowers)
Threshing machines (interior parts)
Wheelbarrows
Pulley frames (hay loader)

OAK, WHITE AND RED

Animal pokes
Belt slats
Bobsleds
Bottoms (manure spreader)
Brake beams
Cider mills
Corn shellers
Cross bars (hay loaders)
Cross pieces (manure spreaders)
Doubletrees
Ensilage cutters
Eveners
Feed cutters
Frames (drag harrow)
Frames (corn sheller)
Handles (cultivator)
Handles (plow)
Harrows
Harrow bars
Hullers
Levers
Neck yokes
Plow beams
Rakes
Reel arms (binders)
Rims (clover huller and motor truck)
Scraper parts
Separator parts
Sills (corn grinder)
Singletrees
Sling hay carriers
Stanchions
Stoneboats
Thresher parts
Tongues
Potato sorter frames and legs
Trucks (silage cutter)
Wagon jacks
Wheelbarrows
Whiffle trees

YELLOW PINE, LONGLEAF AND SHORTLEAF

Beds (wagon)
Boxes (feed mill)
Crushers
Cultivators
Drags for handling grain
Draw bars (harrow)
Elevator heads
Frames (wagon)
Lids (grain drill hopper)
Pole stock
Poles (potato digger)
Poles (sled and roller)
Poles (cultivator, disc harrow, land roller)
Rakes (side delivery)
Seed boxes (grain drill)
Separator parts
Sides and side sills (manure spreaders)
Spreader boxes
Sweeps (feed mill)
Thills (manure spreader)
Threshing machine parts
Tongues (rollers)

SUGAR PINE

Separator (interior parts)
Threshing machine (interior parts)

YELLOW POPLAR

Bodies (fan mills)
Cider mill parts
Corn sheller sides
Feed cutter tables
Frames (hopper)
Hopper boxes (grain drill)
Separator parts
Panels (boxes)
Sled cultivators
Potato sorter parts
Compartments (drill hopper)

SYCAMORE

Threshing machine parts

TABLE XLII. Agricultural implements

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
Shortleaf pine	6,370,500	16.12	$24.51	$156,147	.....	6,370,500
Red oak	6,362,100	16.10	16 50	105,004	455,100	5,907,000
White oak	4,822,600	12.21	37.36	180,166	2,339,600	2,483,000
Cottonwood	4,805,000	12.16	38.94	187,130	.....	4,805,000
Sugar maple	4,187,000	10.60	27.96	117,138	2,032,000	2,155,000
Longleaf pine	3,533,000	8.94	34.88	123,242	.....	3,533,000
Hickory	1,691,500	4.28	43.87	74,205	506,500	1,185,000
Yellow poplar	1,530,700	3.87	37.38	57,214	96,000	1,434,700
Red gum	1,117,000	2.83	20.60	23,007	.....	1,117,000
Basswood	883,000	2.23	29.70	26,224	212,000	671,000
Beech	833,000	2.11	22.18	18,473	358,000	475,000
Douglas fir	600,000	1.52	36.00	21,600	.....	600,000
Norway pine	465,000	1.18	33.11	15,395	.....	465,000
White pine	413,000	1.05	27.10	11,191	.....	413,000
Chestnut	406,000	1.03	18.47	7,500	276,000	130,000
Birch	350,000	.89	13.00	4,550	.....	350,000
Black ash	243,000	.61	31.17	7,575	222,000	21,000
Hemlock	207,000	.52	16.22	3,357	.....	207,000
Cork elm	148,000	.37	28.04	4,150	148,000	.....
White ash	126,000	.32	44.21	5,570	126,000	.....
White elm	105,000	.27	24.62	2,585	85,000	20,000
Sycamore	85,000	.22	31.76	2,700	85,000	.....
Silver maple	83,500	.21	30.99	2,588	65,000	18,500
Cypress	50,500	.13	30.30	1,530	.....	50,500
Sugar pine	50,000	.13	30.00	1,500	.....	50,000
Bur oak	41,000	.10	74.39	3,050	41,000	.....
Cucumber	800	*	40.00	32	800	.....
Total	39,509,200	100.00	$29.43	$1,162,823	7,048,000	32,461,200

*Less than 1-100 percent.

HANDLES

Handles manufactured in Ohio can properly be divided into four classes: First, garden tool and fork handles, like hoe, rake, spade and D shovel, long handle shovels, pitch and hay fork handles, etc. In the quantity of wood consumed the making of this class in Ohio is far more important than the others. Ash is the principal wood, white ash being preferred, but black or gray ash is quite suitable and largely demanded. Stiffness and strength without weight are qualities of ash which fit it preeminently for this line of manufacture. Other woods serve with ash, but according to quantity they are relatively unimportant. They included sugar maple, beech and elm, for garden tools, and the two first named with basswood for fork and shovel handles.

Fig. 18. Mop handle and chair dowels and mill waste from which they are manufactured.

Second are track tool, sledge and axe handles. Besides exceptional strength these tools require handles with the important quality of stiffness and shock resisting ability, which is found in hickory in a greater degree than any other wood. A small quantity of young second growth white oak is reported for pick handles but aside from that hickory alone in Ohio is used for making commodities of this class.

The third class are broom, mop and miscellaneous handles. Large quantities of sugar or hard maple squares are required each year in Ohio for brooms and according to amounts this wood is the

most important. It is not, however, the only suitable broom, handle wood and does not hold relatively the important position in this as ash does in the first and hickory in the second class described above. Beech, basswood, ash and sycamore were the other broom handle woods, hickory being called on for street and stable broom handles and sugar maple for handles of carpet sweepers. Mop handles are made of the same woods only of little lower grades. In Illinois red gum is extensively used for them.

A variety of handles not yet mentioned and belonging to each of the three classes have been listed together with the woods from which they are made. They are:

CLASS	KINDS	WOODS
(1)	Cant hook handles	Hickory Sugar maple
(2)	Jack lever handles	Soft maple Hickory Hard maple
(2)	Mine handles	Hard maple Hickory Ash
(3)	Tinware handles	Sugar maple Beech Soft maple
(3)	Spoon, dipper and other utensil holders and handles	Sugar maple Beech Red gum Basswood
(1)	Pump handles	White oak White ash Sugar maple
(2)	Fence wire stretcher handles	Hickory elm Rock elm
(3)	Brush poles for long handle brushes	Basswood Oak

TABLE XLIII. Handles

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio	Grown out of Ohio
	Feet b. m.	Percent			Feet b. m.	Feet b. m.
White ash	12,195,000	40.00	$31.24	$380,974	11,415,000	780,000
Sugar maple	3,811,998	12.50	22.76	86,773	3,206,998	1,605,000
Black ash	3,766,322	12.35	30.81	116,040	3,263,322	503,000
Hickory	3,435,935	11.27	24.14	82,931	2,710,935	725,000
White oak	2,255,372	7.40	29.37	66,232	2,240,372	15,000
Beech	2,075,916	6.81	20.43	42,410	1,295,916	780,000
Cork elm	1,020,000	3.34	21.91	22,350	1,015,000	5,000
Red gum	960,000	3.15	23.67	22,725	.....	960,000
Basswood	708,385	2.32	23.39	16,566	553,385	155,000
Birch	100,000	.33	26.00	2,600	.....	100,000
White elm	63,307	.21	24.39	1,544	63,307	.....
Red oak	40,000	.13	20.00	800	20,000	20,000
Bur oak	30,000	.10	24.00	720	30,000	.....
Silver maple	23,498	.08	13.36	314	23,498	.....
Sycamore	1,000	*	12.00	12	1,000	.....
Total	30,486,733	100.00	$27.65	$842,991	24,838,733	5,648,000

*Less than 1-100 of one percent.

MATCHES

The manufacture of matches is not a common industry in Ohio, although a considerable amount of wood is utilized for this purpose. White pine, the principal wood employed, constitutes 97 percent of the total. Not a single foot of this wood was obtained in the State. Within recent years Canada has supplied a large amount, and the remainder is brought from California, Oregon and the Rocky Mountain States.

It will be noticed that spruce is another wood appearing in the table following. It was not used for matches but was converted into match cases. The Virginia report shows that yellow poplar, basswood and soft maple supplied the match stick material. New York, Pennsylvania, Maine, and Wisconsin factories consume white pine and some of them a little basswood, while lawson cypress, usually called Port Orford cedar, and sugar pine in large quantities are the woods out of which the California-made matches are manufactured. In Europe poplar, more often called cottonwood in this country, is extensively used, and it makes an excellent match, many of them being shipped to this country.

Wood for match making should be straight-grained, easily worked, and readily ignited and inflammable. A very important consideration is to get a wood that will not retain the glowing ember after the flame has been extinguished. A white, soft and long fibre is also desirable. All match stock is obtained either in 2 inch or 3 inch plank, or in blocks averaging 2 x 2 3-8 inches and any length. An exceptionally good grade of stock is demanded. The veneer match is growing in popularity but none of them were reported as being made in Ohio. They are cut from thin sheets and made into match books used mainly as an advertising novelty. Soft maple is the principal wood used.

TABLE XLIV. Matches

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
White pine	24,000,000	96.00	$34.74	$833,875	.....	24,000,000
Spruce	750,000	3.00	20.00	15,000	.....	750,000
Western white pine	250,000	1.00	35.50	8 875	.....	250,000
Total	25,000,000	100.00	$34.31	$857 750	.....	25,000,000

FIXTURES

The classified products under furniture, sash, doors and general millwork and fixtures are closely related and so often overlap that the lines separating the industries are difficult to define. Fixtures

properly include equipment for offices, stores, lodge rooms, saloons, banks, hotel lobbies, court houses, churches and cabinets for dentists and surgeons, account registers, cash registers and index files, besides other special work of similar character too varied to mention. These are distinguished from the class of material going into high grade inside finish, mantels, and house cabinet work, included in general millwork by the fact that when in place the latter are stationary, while fixtures are movable. They are separated from furniture according to the uses of the finished products. Office and store desks, tables and book cases belong under the heading fixtures, while similar commodities for the residence are put in the furniture class. Practically the same woods and grades are employed for fixtures as for furniture, and they are generally speaking of two classes, one for outside work, the other for interior parts not intended to show. For the former veneer stock is largely used and rapidly growing in favor, chestnut being the favorite wood supplying the backing or core material. Solid woods for finish are probably given preference over veneer work, which largely accounts for the high average price as shown in the table.

White oak furnishes 30.30 percent of the total fixture woods and about one-third of the supply is obtained in the State. In every state oak is a great favorite in this line and will always be one of the principal woods for exterior work. Included with the amounts of this wood is a large quantity of quartered oak. For high-grade fixtures quartered material is preferred to plain wood, since the beauty of the grain can be shown to a better advantage. In price, however, quartered oak averages about $12 to $20 per thousand feet higher.

Birch is ahead of any wood for imitating mahogany, which accounts for its use among the finishing woods. While yellow poplar in considerable quantity is made into panels for painted and enameled work, the greater part, with basswood and maple, is utilized for backing. shelving and hidden work. The average cost of red oak is lower than white and a notable difference is found in the quantity used. It being more porous, requires a greater amount of filler in the finishing, which, in part, tends to offset the variation in price. Three foreign woods are included in the requisition of the fixture makers. They are mahogany, Circassian walnut, and teakwood. Practically all the Circassian walnut is used in veneer form, and is lower in average price than that shown in the other industries reporting it. The small amount of teak used comprises the entire amount returned for the State. It is a very hard wood

and a large portion of the supply shipped to this country comes from India. This is one of the industries that calls on the State for a good portion of its raw material, about three-eighths of the total amount being grown in Ohio.

TABLE XLV. Fixtures

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
White oak	4,234,305	30.30	$ 46.97	$198,872	1,515,534	2,718,771
Sugar maple	1,829,400	13.09	25.65	46,933	1,759,400	70,000
Birch	1,443,844	10.33	37.80	54,573	10,000	1,433,844
Yellow poplar	1,421,600	10.17	37.42	53,199	297,100	1,124,500
Red oak	1,248,000	8.93	39.96	49,876	578,000	670,000
Chestnut	968,445	6.93	22.31	21,605	118,445	850,000
Basswood	762,300	5.46	25.53	19,464	347,300	415,000
Mahogany	643,364	4.60	142.54	91,702	.....	643,364
White elm	536,000	3.84	20.99	11,253	500,000	36,000
Shortleaf pine	322,000	2.30	30.23	9,734	.....	322,000
Cypress	151,000	1.08	32.02	4,835	.....	151,000
Red gum	145,000	1.04	26.79	3,885	.....	145,000
Longleaf pine	85,000	.61	30.00	2,550	.....	85,000
White pine	57,000	.41	40.00	2,280	.....	57,000
Cottonwood	30,000	.22	40.83	1,225	5,000	25,000
Cherry	25,600	.18	41.17	1,054	23,600	2,000
Beech	20,000	.14	25.00	500	.....	20,000
Silver maple	20,000	.14	22.50	450	20,000	.....
Black walnut	12,600	.09	59.84	754	12,600	.....
White ash	12,000	.09	38.00	456	.....	12,000
Circassian walnut	6,000	.04	225.00	1,350	.....	6,000
Teak	1,000	.01	250.00	250	.....	1,000
Total	13,974,458	100.00	$ 41.28	$576,800	1,186,979	8,787,479

BUNGS

The Forest Service has made studies similar to this in thirty states. So far Ohio leads in the production of bungs and their manufacture is centered in the city of Cincinnati. When this industry started probably the raw material was obtained within a radius of twenty-five miles. At present nearly the entire amount of material needed is obtained without the State, mainly in Tennessee, Kentucky, and West Virginia, and the manufacturers are searching over a wider extent of territory each year to satisfy their demands.

These commodities are essentially products of but one wood, yellow poplar. The table shows it furnished over 95 percent of the total, which indicates that its suitability for this line of manufacture is superior to any other wood that has been tried up to date. Yellow poplar is straight-grained, soft, easily worked, strong, and it does not shear easily and contracts evenly, having a very uniform structure, all important considerations in driving the bung. Furthermore, its tendency to swell on coming in contact with liquids

makes the bung fit tightly, which is also a valuable characteristic. The pines can not be utilized as well for this purpose, because of the alternating hard and soft structure of the wood. Other woods for bungs, reported only in small quantities, are white oak, walnut and red gum. Cotton gum or tupelo has not been given an opportunity to demonstrate its suitability for this service, but as its qualities become better understood it doubtless will be called on to substitute for yellow poplar especially as it is lower in cost and more easily obtained. The red gum is comparatively a new wood in this industry which from the amount consumed indicates that it measures up to requirements fairly successfully. A good grade of material is required for bungs, being obtained in the form of rough lumber or planks, full 4-4 inch in thickness. Spilers or vent plugs were principally made from yellow poplar, but also from white pine and spruce.

TABLE XLVI. Bungs and faucets

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
Yellow poplar	9,620,000	95.40	$27.30	$262,620	.....	9,620,000
Red gum	175,000	1.73	20.00	3,500	.....	175,000
White oak	165,000	1.64	16.55	2,730	140,000	25,000
Black walnut	51,000	.50	30.15	1,538	21,000	30,000
White pine	37,000	.37	18.00	666	.....	37,000
Spruce	36,000	.36	28.00	1,008	.....	36,000
Total	10,084,000	100.00	$26.98	$272,062	161,000	9,923,000

DAIRYMEN'S, POULTERERS' AND APIARISTS' SUPPLIES

Advance toward more scientific management in the occupations of dairymen, poulterers, and apiarists has created a wide demand for special equipments of the new methods involved and in consequence factories manufacturing these commodities have sprung up in several states. These establishments and their products are distinct industries and have been combined statistically in this report under one heading for convenience, because it was not possible to present them in individual tables. In dairymen's supplies Ohio manufacturers report making churns of various sizes and kinds from the small domestic churn propelled by hand to the large barrel churns used in creameries and also dash churns. In all the States in which studies similar to this have been made, white ash is preeminently the leading wood for churns. In Ohio close to half a

million feet a year is used for this purpose and this wood is chosen not only for the staves but also for the paddles because more than any other wood it is considered less liable to affect the taste of the contents. For the same reason ash is the leading wood for butter tubs. Cheese boxes are the only other dairy products made in Ohio. The raw material is purchased in the log and cut into veneer for the sides and the rims of lids, while the head and the bottom of these boxes are made of a little thicker material, about quarter-inch lumber. A number of woods answer for making cheese boxes; maple leads all others followed by basswood, soft elm, and yellow poplar; the others were cottonwood, beech, ash, and cucumber, reported in only nominal quantities.

Fig. 19. Lumber yard of a manufacturer of bee keepers' supplies.

The manufacturers of poulterers' equipment require over a million feet of lumber annually. Redwood is the principal species which with cypress goes mainly into incubator cases. For egg trays and other inside work yellow poplar is used and yellow pine, ash, and shortleaf pine for the tops and bottoms of the incubators. Brooder cases are made from yellow poplar and basswood with the bottoms and platforms of shortleaf pine and chestnut, the latter being preferable. In making portable poultry houses the roof is frequently of chestnut and yellow pine with the sides and frame parts of pine, shortleaf being the species reported.

Beehives are made of three kinds of wood in Ohio. White pine answers for the sides and tops, cypress for the bottoms and frames, and basswood for honey boxes, with a small amount of sycamore for other interior parts.

TABLE XLVII. Dairymen's, poulterers', and apiarists' supplies

Kind of wood	Quantity used annually		Average cost per 1,000 f.t	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
White pine	2,350,000	24.05	$30.00	$ 70,500	.....	2,350,000
Basswood	2,120,000	21.70	25.71	54,510	1,090,000	1,030,000
White elm	1,095,000	11.21	22.73	24,890	1,095,000	.....
Cypress	1,035,000	10.59	26.74	27,680	.....	1,035,000
White ash	861,000	8.81	28.05	24,147	456,000	405,000
Redwood	518,000	5.30	32.10	16,630	.....	518,000
White oak	480,000	4.91	15.92	7,640	250,000	230,000
Red oak	287,000	2.94	10.16	2,917	286,000	1,000
Yellow poplar	253,000	2 59	30.30	7,667	34,000	219,000
Chestnut	240,000	2.46	18.00	4,320	.....	240,000
Shortleaf pine	210,000	2.15	16.25	3,412	.....	210,000
Western red cedar	175,000	1.79	35.00	6,125	.....	175,000
Silver maple	52,000	.53	10.27	534	52,000	.....
Sugar maple	45,000	.46	29.89	1,345	25,000	20,000
Cottonwood	25,000	.26	25.00	625	25,000	.....
Beech	22,000	.22	19.09	420	22,000	.....
Sycamore	2,000	.02	20.00	40	2,000	.....
Cucumber	1,000	.01	20.00	20	1,000	.....
Total	9,771,000	100.00	$25.94	$253 422	3 338,000	6,433,000

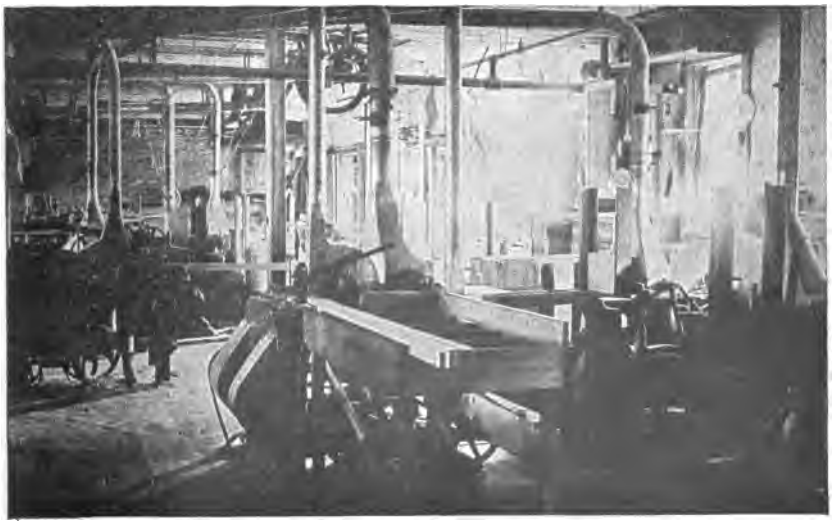


Fig. 20. Machinery setting for making brooders and incubators.

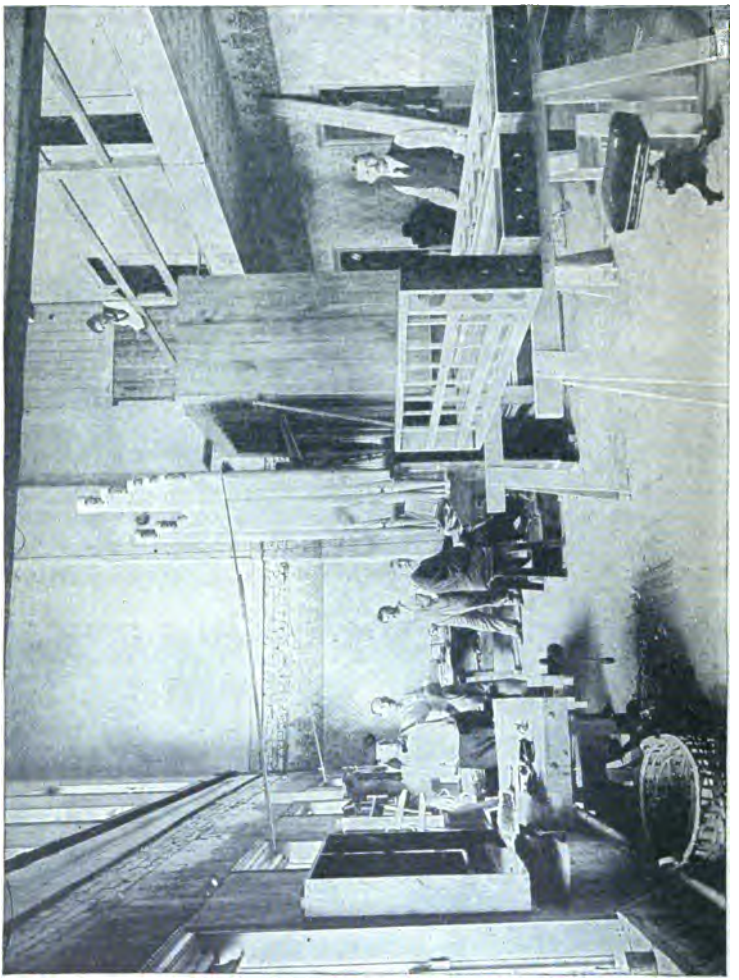


Fig. 21. Assembling room of a pipe organ manufacturer.

MUSICAL INSTRUMENTS

Pianos and organs are the only products reported under this heading, but the industry is an important one in Ohio and the aggregate quantity of wood used is quite large. A large majority of the manufacturers make only certain parts and purchase a portion of their material already to put in place from factories specialing in these lines. Only a few makers today manufacture the piano or organ complete. Spruce is the essential wood for piano sounding boards. It must be carefully seasoned and manufactured, and since they are made from wide stock, trees that are suitable are sought after over great distances, until now many are shipped from the northern Pacific Coast states and British Columbia, where Sitka spruce meets the demand. Trees obtained from high altitudes, where the rate of growth is slow and the annual rings closer together, are preferred for sounding boards and ribs, and bring higher prices.

Chestnut is the first wood on the list for piano shells or cases, to which is glued an overlay of veneer of some expensive cabinet wood which gives the finish. The light weight, combined with strength, durability and gluing properties put chestnut ahead of any wood for this purpose. White ash being stronger and less liable to warp than chestnut probably accounts for the tops of grand pianos being made from it. Sugar and silver maple, elm, ash and sycamore, are the woods going into posts and back casing. Owing to its hardness and strength, sugar maple also finds service for wrists, pin blocks, action parts and other mechanical pieces in the piano. It is almost an exception when other woods than this are used for action parts. Piano legs are of a variety of woods, red oak probably being the foremost, because of its great strength and being porous it holds veneer well. It is interesting to note that neither ebony nor white pine, the principal key woods, were reported, which indicates that piano keys are manufactured elsewhere and shipped to the Ohio manufacturers. Basswood to a limited extent was used in other states for piano keys but in Ohio with sugar maple and black walnut it serves for organ keys.

Action chests in organs are of a strong wood, usually red oak or some other species of oak, white pine, sugar pine, redwood and cherry all answer for organ pipes, while for organ bellows, windchests and swell boxes white pine, basswood, Sitka spruce, and red spruce were the ones reported. These woods are employed owing to their being fairly strong, light in weight, free from pitch, and holding their shape well. Redwood has begun to be used by the eastern manufacturers for parts of organ framework, and being a suitable wood and in high favor with the manufacturers for that purpose, will probably be used more extensively in the future.

White and red quartered oak, mahogany, black walnut, red gum, cherry, and Circassian walnut, are employed chiefly as veneer for exterior finish of pianos and organ cases.

TABLE XLVIII. Instruments, musical

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio	Grown out of Ohio
	Feet b. m.	Percent			Feet b. m.	Feet b. m.
Chestnut	1,666,000	19.41	$ 18.19	$ 30,310	30,000	1,636,000
Sugar maple	1,307,000	15.23	27.33	35,723	24,500	1,282,500
Silver maple	1,062,000	12.37	29.79	31,640	7,000	1,055,000
Basswood	1,013,000	11.80	38.34	38,835	40,000	973,000
Yellow poplar	823,000	9.59	45.41	37,372	5,000	818,000
White elm	460,000	5.36	23.74	10,920	300,000	160,000
Red gum	420,000	4.89	29.43	12,360	.....	420,000
White oak	271,000	3.16	33.25	9,012	134,500	136,500
Mahogany	261,300	3.04	108.30	28,298	.....	261,300
Spruce	245,000	2.86	37.13	9,098	.....	245,000
Black walnut	167,800	1.96	103.50	17,365	72,500	95 300
Red oak	154,000	1.80	19.19	2,956	2,000	152,000
Beech	144,000	1.68	18.50	2,664	.....	144,000
Birch	125,000	1.46	30.48	3,810	.....	125,000
White pine	117,000	1.36	50.90	5,955	.....	117,000
White ash	76,000	.89	50.71	3,854	.....	76,000
Hemlock	48,000	.56	21.56	1,035	.....	48,000
Cherry	47,500	.55	82.59	3,923	34,000	13,500
Sycamore	40,000	.47	32.00	1,280	10,000	30,000
Redwood	33,000	.38	50.00	1,650	.....	33,000
Norway pine	30,000	.35	34.00	1,020	.....	30,000
Douglas fir	20,000	.23	45.00	900	.....	20,000
Shortleaf pine	15,000	.17	24.00	360	.....	15,000
Sitka spruce	15,000	.17	45.00	675	.....	15,000
Sugar pine	15,000	.17	90.00	1,350	.....	15,000
Butternut	6,000	.07	22.50	135	6,000	.....
Circassian walnut	1,500	.02	250 00	375	.....	1,500
Total	8,583,100	100.00	$ 34.12	$292,875	665,500	7,917,600

TANKS, VATS AND SILOS

Although within the past ten years metal tanks have for a number of purposes replaced the wooden ones such as those on windmills and elevated by factories for storage of water, it is generally conceded that the demand for wooden tanks has greatly increased. The brewery and distilling vats of necessity have to be of wood, while silos, which the farmer finds almost indispensible, with the exception of a small percent built of concrete and brick, are entirely made of lumber.

Longleaf yellow pine, cypress, white pine, and redwood from the Pacific Coast region, are the principal silo regions. Vat staves are made from cypress and white pine as these woods are less liable to affect the taste of food stuff contained in them from which the beverages are being made.

Water tanks and also cisterns which are placed in attics of suburban and rural residences, were made from cypress, yellow pine, and white pine, the last being the western white pine cut

largely in the Rocky Mountain, and also in the Pacific Coast states. Experiments have been tried within the past year to substitute cheaper and less durable woods in tank-making by means of preservative treatment, but it has been found that the oils and salts used for impregnating the wood imparted a taste to the water. It was successful, however, in tanks for water storage for mechanical purposes as along railroads and for factory consumption, and along these lines the demand for treated staves will probably increase. The manufacture of silos, vats and tanks, requires the best grades, usually clear stock, which accounts for the average price of the tank woods being nearly at par with the furniture and implement materials.

TABLE XLIX. Tanks and silos

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
Longleaf pine	5,984,000	70.90	$24.71	$147,888	.....	5,984,000
Cypress	1,730,000	20.50	49.70	85,990	.....	1,730,000
White oak	400,000	4.74	85.00	34,000	200,000	200,000
Western white pine	162,000	1.92	55.00	8,910	.....	162,000
White pine	100,000	1.18	34.25	3,425	.....	100,000
Hemlock	30,000	.36	23.33	700	.....	30,000
Redwood	24,000	.28	60.00	1,200	.....	24,000
Shortleaf pine	10,000	.12	18.00	180	.....	10,000
Total	8,440,000	100.00	$33.45	$282,293	200,000	8,240,000

CASKETS, COFFINS AND OUTER CASES

Table L following, concerns the woods used in making caskets, coffins and burial or outer cases and shipping cases sometimes called rough boxes. The last named are usually made of softwoods and in Ohio white pine was practically the only wood used, though a small amount of hemlock was reported. Some of the lumber is obtained dressed and matched, but the most of it is ordered in the rough and preferably in a medium grade, as rough boxes require considerably better stock than that employed in the manufacture of boxes and shipping cases. Chestnut was called on in greater amounts than all other casket and coffin woods combined and only for cloth covered caskets. Long ago this wood was found especially durable underground, and this together with its quality of lightness, strength and its susceptibility for holding glue that fastens the cloth accounts for its being the principal wood for this purpose. Disinterments after 30 years have been made and the chestnut caskets found sufficiently sound for reburial. Inasmuch as black broadcloth is used for the outside finish the sound wormy grade has proved thoroughly practical and is the one usually employed. The other woods

competing with chestnut are yellow poplar, white oak, red oak, mahogany, basswood and red cedar. The last named wood comes from the Pacific Coast and is gaining in popularity with eastern casket makers. It resembles and is quite similar to the southern red cedars which years ago were extensively employed for making coffins on account of their excellent durability. The absence of cypress is somewhat surprising, as this wood in a number of states is quite prominent in this line of manufacture. The higher price caskets are not cloth covered but are finished naturally with a high polish like that used for pianos and in cabinet work and some are richly carved. Red and white quartered oak, mahogany and black walnut were the woods used.

Only two factories in Ohio reported the manufacture of coffins. They do not make all of the coffins used in Ohio, because many are made by hand by the cabinet makers throughout the State, statistics of which are not included because it was impracticable to gather them. Yellow poplar is the principal coffin wood throughout all the states. It takes stain readily and is finished in imitation of more expensive woods, principally mahogany. Walnut and mahogany are sometimes used for higher grade coffins, while perhaps the cheapest coffin is made from chestnut with only a varnish finish.

TABLE L. Caskets and coffins

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
White pine	3,615,000	45.53	$28.82	$104,220	.....	3,615,000
Chestnut	3,128,000	39.40	19.55	61,154	258,000	2,870,000
Yellow poplar	340,000	4.28	26.76	9,100	70,000	270,000
Hemlock	250,000	3.15	11.35	2,837	.....	250,000
White oak	232,000	2.92	55.22	12,812	112,000	120,000
Red oak	170,000	2.14	53.35	9,070	10,000	160,000
Red gum	75,000	.95	27.49	2,062	.....	75,000
Mahogany	60,000	.76	83.58	5,015	.....	60,000
Basswood	25,000	.31	28.00	700	.....	25,000
Red cedar	25,000	.31	51.60	1,290	.....	25,000
Black walnut	20,000	.25	74.00	1,480	10,000	10,000
Total	7,940,000	100.00	$26.42	$209,740	460,000	7,480,000

WOODENWARE AND NOVELTIES

Woodenware is the caption selected to cover articles useful to the household, such as chopping bowls, biscuit boards, potato stompers, pails and buckets, ice cream freezers, step ladders, rolling pins, ironing boards, etc. The Ohio manufacturers report making only pails and buckets, ice cream freezers, mop wringers and wringer tubs, hose reels and ladders. A portion of the pails

made in Ohio are used as packages for the shipment of candy and tobacco, and for their manufacture cypress and white cedar or juniper shipped from the South Atlantic States were the woods used. Pails and buckets for miscellaneous purposes were made from basswood and white pine, and to a less extent from beech and soft maple. The two latter woods answered as the chief material for freezers and pails. Cypress shipped from Louisiana was imported in large quantities to be converted into ice cream freezers. The manufacturer buys his material for these and also for pails, in the form of bolts of the required length ready to go directly to the stave saws. In New England and the Lake States white pine alone answers as the wood for ice cream freezers, while in Virginia and North Carolina southern white cedar, locally called juniper, served with cypress in almost equal quantities in meeting the demand. Only recently in Ohio has cypress answered as a substitute for white pine as a freezer wood due perhaps not so much to the superior durable quality of cypress, a white wood being preferred, as to the poor grades of the northern white pine now available at a price which justifies its use. The dasher scraper in freezer cans when of wood is made from sugar maple and the handle of the crank used in revolving the can is made of beech or maple.

Fig. 22. Piling staves in Ohio.

The only wooden parts of mop wringers are the rollers. They are made mainly of sugar maple, and some of beech, purchased in the form of squares 1 7-16 x 8 inches long. The buckets and tubs to which the wringers are attached are sometimes of metal, but mostly of wood and cypress is the wood most often demanded.

Reels for garden hose are extensively manufactured in Ohio and each year large quantities of lumber are called for in this line of manufacture. Oak, both red and white, purchased in log-run grades, furnished the principal material. Ladders, especially the sides or uprights, were made of various woods, both hard woods and soft woods. The rungs were entirely of hickory purchased in the form of squares 1 1-4 x 1 1-4, 16 to 22 inches long.

Novelties include so many different kinds of articles that it is difficult to define, and especially to draw the line separating them from woodenware. The general distinction may be made by stating that commodities entitled woodenware are strictly useful and handy around households, while novelties are more or less ornamental including advertising specialties and products turned out by variety works. Spheres made from basswood and used for geographers globes are among the products of this class in Ohio, likewise coat hangers, necktie rings, carvings, batons, gavels, flag pole tops and emblems, pen racks, etc. Usually hardwoods in expensive grades were required for this line of manufacture.

TABLE LI. Woodenware and novelties

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
Basswood	3,914,000	55.24	$22.69	$ 88,810	1,454,000	2,460,000
White ash	506,000	7.28	32.65	16,595	256,000	250,000
Cucumber	500,000	7.06	17.00	8,500	500,000	.....
Beech	450,000	6.35	13.34	6,000	450,000	.....
Silver maple	370,000	5.22	12.38	4,580	350,000	20,000
Sugar maple	345,000	4.87	29.20	10,075	115,000	230,000
Red oak	275,000	3.88	16.45	4,525	25,000	250,000
Cypress	226,000	3.19	18.12	4,095	.....	226,000
Norway pine	200,000	2.82	38.00	7,600	.....	200,000
Birch	91,000	1.28	44.95	4,090	.....	91,000
Hickory	63,000	.89	59.28	3,735	63,000	.....
White elm	50,000	.71	16.00	800	50,000	.....
Southern white cedar	50,000	.71	18 00	900	.....	50,000
Red gum	21,000	.29	25.71	540	.....	21,000
Yellow poplar	8,000	.11	40.00	320	8,000	.....
White oak	5,000	.07	35.00	175	5,000	.....
White pine	2,000	.03	50.00	100	.....	2,000
Total	7,076,000	100.00	$22.82	$161,440	3,276,000	3,800,000

REFRIGERATORS AND KITCHEN CABINETS

The products represented by Table LII include the manufacture of kitchen cabinets and cupboards and refrigerators for home use and built-in refrigerators or coolers used by butchers and others doing business requiring cold storage equipment. The combination kitchen cabinet having compartments providing a handy place for all the accessories for cooking necessary to be kept in the kitchen has in late years come into popular demand and many factories specialize in making them. Because they are sold at a low price cabinets and cupboards are made of lower grades of woods than furniture. The outside work is largely made of plain oak both white and red and to a limited extent from chestnut and hard maple. Soft maple, yellow birch and red gum enter into backs, while the shelving and drawer sides and bottoms and compartments are made from yellow poplar, basswood, sycamore, and red gum. Soft elm and cypress went into frame work.

In the manufacture of refrigerators cypress is the leading wood selected because of its durability where it is damp, and is employed for ice pans and inside lining. White pine and spruce are also used but in less quantities. Pan joists, framing, and reinforcements are of yellow poplar and white pine, while yellow poplar with shortleaf pine answers for door parts. The built-in refrigerators and cooling rooms used in hotels and business houses are made of a number of woods which accounts for the long list, shown in the following table.

TABLE LII. Refrigerators and kitchen cabinets

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
Red gum	1,221,000	21.21	$23.40	$ 28,574	.....	1,221,000
White oak	903,000	15.68	27.69	25,001	435,000	468,000
Yellow poplar	894,987	15.54	22.41	20,059	30,000	864,987
Red oak	811,056	14.09	32.54	26,395	290,000	521,056
Shortleaf pine	389,542	6.76	32.31	12,587	.....	389,542
Cypress	342,000	5.94	32.93	11,262	.....	342,000
Sugar maple	311,209	5.40	22.22	6,916	70,000	241,209
Birch	252,106	4.38	30.13	7,596	.....	252,106
Spruce	150,000	2.60	37.00	5,550	.....	150,000
Basswood	134,000	2.33	28.29	3,791	45,000	89,000
Cottonwood	78,500	1.36	32.11	2,521	.....	78,500
White elm	70,000	1.22	24.00	1,680	70,000	.....
Norway pine	50,000	.87	32.00	1,600	.....	50,000
Western yellow pine	50,000	.87	56.00	2,800	.....	50,000
Chestnut	24,000	.42	20.71	479	20,000	4,000
Silver maple	24,000	.42	22.08	530	20,000	4,000
Longleaf pine	20,000	.35	20.00	400	.....	20,000
Sycamore	15,000	.26	15.00	225	15,000	.....
Black gum	14,500	.25	14.97	217	14,500	.....
Sitka spruce	3,000	.05	40.00	120	.....	3,000
Total	5,757,900	100.00	$27.50	$158,321	1,009,500	4,748,400

CHAIRS

In Table LIII, fourteen woods are reported as entering into the production of chairs, and a total of 5,333,500 board feet is required for this purpose. Possibly it is the opinion of some that this industry should be consolidated with furniture, but in Ohio, as in other States, the manufacture of chairs is essentially a separate industry. The average price paid for the raw material indicates that a fairly good grade of chairs is turned out, but the products made include every kind from a cheap office stool or a kitchen chair to highly carved ecclesiastical and lodge room chairs. In comparison with the price for wood shown in the furniture table, chair makers pay $10.74 per thousand feet more. This does not indicate, however, that better grades of lumber, comparing species with species, is used, but that the large proportion of furniture materials are cheaper woods, employed for veneer backings and other hidden work, while the expensive exterior woods being mostly thin sheets of veneer make up only a small percentage of the total and therefore do not tend to aid much in raising the average price.

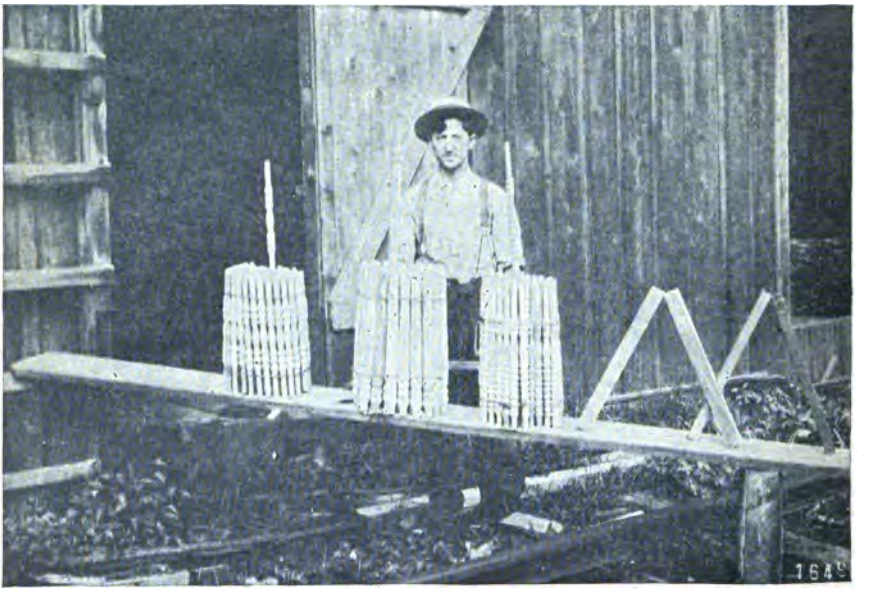


Fig. 23. Chair stock and the squares from which they are turned. The squares were bolted from slabs.

Dimension stock is utilized in the chair industry to a greater extent than any other. A number of both the large and small sawmills and a few factories throughout the State as a side

line turn and rip thin low grades and culls into rough turned and dimension stock. Frequently small, crooked logs, tops, wind shakes, cut offs, etc., which could be worked in no other way are thus disposed of. It is interesting to notice that the chair makers report obtaining two-thirds of their stock in the State and that the waste is relatively quite small.

Chair dimensions include principally sizes for all parts of many kinds of chairs and nearly every wood is included. The sizes of the dimensions vary from seat stock and backs 4 to 6 1-4 inches wide down to the dowel 7-8 x 7-8 and 14 inches long. The above dimensions are seasoned before used, so the producer must take care that allowance is made for shrinkage and checking when cutting from green stock. Chair makers desire material to be straight grained, free from defects and cut accurately to the dimension, and that the squares be bundled.

Oak both red and white together are according to quantities the most important woods. The large amount of mahogany reported in comparison with the other woods indicates that it is a popular wood with the Ohio chair makers. Unlike other industries, this wood is largely bought in the form of lumber instead of veneer, and the price paid, 166.45, signifies a good grade. The red gum, which will undoubtedly come more into use, is employed in the cheaper chairs, either as imitations of the more expensive woods notably oak and mahogany, with which it can be used until it is difficult to tell the difference, or finished in its natural color to resemble Circassian walnut. The other woods listed in the table are used for various designs, basswood and yellow poplar going as seats and backs of cheap chairs or as cores for veneer work.

TABLE LIII. Chairs

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
White oak	3,180,000	59.62	$ 34.37	$109,223	2,180,000	1 000,000
White elm	510,500	9.57	27.40	13,976	162,000	348,500
Sugar maple	339,000	6.36	28.35	8,932	238,000	101,000
Mahogany	337,000	6.31	166.45	56,100	.....	337,000
Red oak	315,000	5.91	33.31	10,492	170,000	145,000
Red gum	243,000	4.56	33.06	7,305	.....	243,000
Silver maple	170,000	3.19	23.24	3,950	160,000	10,000
Beech	130,000	2.44	18.92	2,460	130,000	.....
Basswood	40,000	.75	30.00	1,200	40,000	.....
Yellow poplar	40,000	.75	35.50	1,420	15,000	25,000
Hickory	14,000	.26	28.57	400	14,000	.....
White ash	12,000	.22	30.00	360	12,000	.....
Chestnut	2,000	.04	22.00	44	.....	2,000
Black walnut	1,000	.02	70.00	70	1,000	.....
Total	5 333,500	100.00	$ 40.49	$215,932	3,122,000	2 211,500

MACHIINE CONSTRUCTION

All machinery that does not belong to electrical equipment or agricultural machinery and that requires wood for making some of its parts is grouped under a separate classification. Table LIV therefore represents parts of sawmills, steam shovels, cranes, hoists, well machinery, folding machines, dredges, attrition mills and crushers, brick presses, engine skids, etc. Nineteen species are reported and the total amount gives this industry a standing next to the groups of chair makers and ahead of ship builders and trunk manufacturers.

White oak takes the lead, furnishing 23.38 percent of the total of the woods called for. Red oak in the other industries can compare favorably with white oak as to the amount used, but here it is reported in only a minor amount. A large part of the material listed goes for construction of frames, braces, platforms, skids, etc., where great strength, toughness and durability are the important factors, and which accounts for white oak being the leading wood. The other species are listed in the table in the smaller amounts but for a variety of uses in connection with machinery of all kinds.

The available statistics are as follows:

TABLE LIV. Machine construction

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
White oak	1,134,000	23.38	$36.70	$ 41,616	874,000	260,000
Shortleaf pine	575,000	11.85	16.33	9,390	.....	575,000
Sugar maple	514,000	10.60	23.13	11,890	447,000	67,000
Longleaf pine	489,351	10.09	28.51	13,950	.....	489,351
Douglas fir	413,000	8.51	50.60	21,020	.....	413,000
Beech	402,000	8.29	17.99	7,230	402,000	.....
Norway pine	320,000	6.60	25.44	8,140	.....	320,000
Hemlock	260,000	5.36	17.50	4,550	.....	260,000
Yellow poplar	175,000	3.61	37.71	6,600	60,000	115,000
White pine	160,000	3.30	50.63	8,100	.....	160,000
White elm	140,000	2.89	25.28	3,539	140,000	.....
Red oak	73,500	1.51	24.01	1,765	73,500	.....
Cypress	70,000	1.44	47.86	3,350	.....	70,000
Cherry	55,000	1.13	38.00	2,090	40,000	15,000
Basswood	25,000	.51	26.00	650	25,000	.....
Black ash	20,000	.41	38.00	760	20,000	.....
Black walnut	10,000	.21	38.00	380	10,000	.....
Hickory	10,000	.21	38.00	380	10,000	.....
Butternut	5,000	.10	32.00	160	5,000	.....
Total	4,850,851	100.00	$30.01	$145,560	2,106,500	2,744,351

CIGAR BOXES AND TOBACCO CASES

Distinct from the firms manufacturing crates and boxes, as noted under that heading, are those engaged in the cigar box industry. Ohio stands well up in the list of states engaged in this

line, consuming 4,733,186 board feet annually and requiring eight separate woods for the purpose. Florida, with Tampa and Key West as its leading cities, has long been noted for its fine cigaas, and the advantages of being near the source of supply and requiring the best wood for that class of products, enables the manufacturers to use Spanish cedar entirely. But it is radically different in Ohio and neighboring states. Here the cigar makers are satisfied with a cheaper box, because their grade of product as an average cannot afford a more expensive one. Practically all the cigar boxes made in the State are constructed of two-ply stock, a cheaper wood overlaid with Spanish cedar veneer. Cotton gum, red gum, and yellow poplar are the principal low-priced domestic woods used for this purpose, preference being given to the gums, because the increasing high price of old yellow poplar is likely taking it out of reach. It is difficult now to find even a few mills that are turning out thin yellow poplar for cigar box material, and no doubt within the next few years this wood will practically cease to be a factor in this line of manufacture.

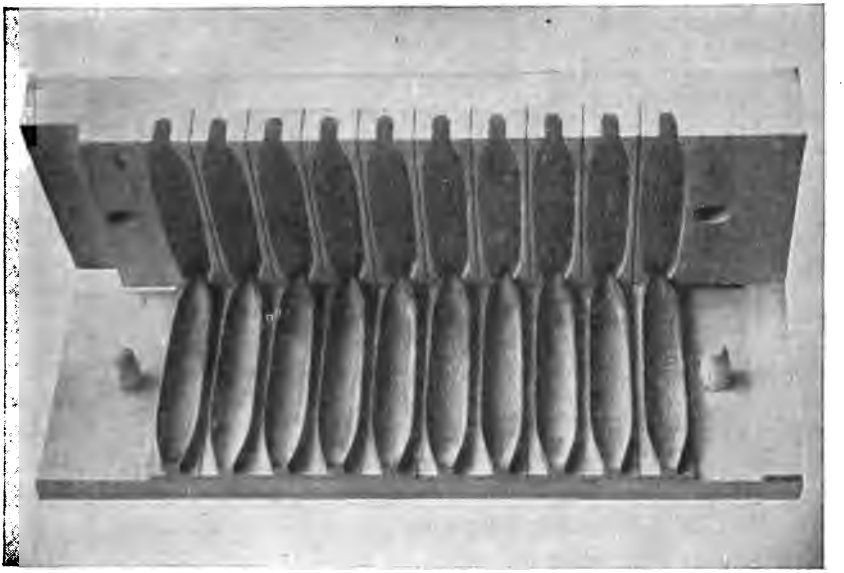


Fig. 24. Cigar mold made of poplar, beech and maple. (Statistics included under Miscellaneous.)

Tupelo or cotton gum and red gum are both admirable woods for this purpose, they work easily and with the improved methods of kiln-drying veneer there is little difficulty in their twisting and warping after manufacture. The custom of stamping these woods,

so as to imitate Spanish cedar is quite prevalent and of late the improvement in this line often makes it difficult without close inspection to separate the imitation from the cedar. Care must be taken in selecting the proper wood for cigar boxes, because when the cigars are packed in tight and moist, some woods are apt to impart a taste or odor. Spanish cedar, it is claimed, gives a delicate odor to the cigar which is found in no other wood. This accounts for the fact that sometimes when other woods are employed as in two-ply stock, with Spanish cedar, the latter is put on the inside in contact with the contents.

Where the domestic woods are independently used, most often the inside of the box is covered with lithe paper advertising the name of the cigar and the maker. There is little waste in cigar box manufacture, as the ends can be made from what is left after tops, bottoms and sides are made.

For tobacco boxes like containers for plug, smoking, and chewing tobacco, sycamore and red gum are the favorites. Both of these woods are eminently suited for the purpose and in order to prevent the liquor and moisture on the inside causing them to warp, they are usually used in the form of three-ply veneer. The entire supply of these woods comes from outside the State.

TABLE LV. Cigar boxes

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
Cotton gum	1,810,000	38.25	$ 43.71	$ 78,800	....	1,810,000
Red gum	1,798,270	37.99	17.77	31,956	....	1,798,270
Spanish cedar	477,250	10.08	124.41	59,374	....	477,250
Yellow poplar	246,491	5.21	82.85	20,420	....	246,491
White pine	199,425	4.21	19.60	3,909	....	199,425
Sweet magnolia	75,000	1.58	12.00	900	....	75,000
Red cedar	66,750	1.41	58.05	3,875	....	66,750
Northern white cedar	60,000	1.27	30.00	1,800	....	60,000
Total	4,733,186	100.00	$ 42.47	$201 034	.. .	4,733,186

All cigar box lumber is bought by the superficial foot. In order to conform to the other tables of this report, it was necessary to reduce the surface feet to board measure; and by the same factor to change the price. This will perhaps make the price of the material appear somewhat high, since the cost of manufacture has not been eliminated nor any allowance made for waste. The following list will give the reader some idea of the average prices paid by cigar box manufacturers according to surface measure:

Spanish cedar.....$30.00
Cotton or tupelo gum..... 17.00
Red gum..... 18.00
Yellow poplar..... 20.00

PLUMBERS' WOODWORK

The manufacturers of plumbers' supplies report the use of 4,691,000 feet of wood for their product. White oak easily heads the list, furnishing over sixty-seven percent of the total amount. In Ohio this industry is confined entirely to the manufacture of water closet seats and tanks, and woods with considerable figure and susceptible of taking a fine finish, like those used for fixtures and furniture, are the ones reported. Naturally plain and quartered white and red oak lead the lists and are followed by others for exterior work such as ash, sweet birch, cherry, mahogany, sugar maple and black walnut. Quantities of sweet birch were demanded because better than any other wood it can be finished to imitate mahogany, while soft maple and yellow poplar answered for painted or enameled work. Chestnut and yellow poplar and red gum, principally yellow poplar, served as tank backing. Only fifteen percent of the wood used in this industry was home-grown. The greater part of the incoming lumber was shipped from the south.

TABLE LVI. Plumbers' woodwork

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
White oak	3,175,000	67.58	$ 33.15	$105,250	350,000	2,825,000
Yellow poplar	650,000	13.84	17.31	11,250	.....	650,000
Silver maple	260,000	5.53	23.46	6,100	.....	260,000
Birch	235,000	5.00	28.91	6,795	50,000	185,000
Chestnut	110,000	2.34	22.64	2,490	100,000	10,000
Red gum	85,000	1.81	24.47	2,080	60,000	25,000
Sugar maple	60,000	1.28	33.33	2,000	50,000	10,000
White ash	50,000	1.07	30.00	1,500	.....	50,000
Cherry	41,000	.87	51.95	2,130	10,000	31,000
Mahogany	22,000	.47	143.64	3,160	.....	22,000
Black walnut	10,000	.21	80.00	800	10,000	.....
Total	4,698,000	100.00	$ 30.56	$143,555	630,000	4,068,000

TRUNKS AND VALISES

The manufacture of trunks is one of the less important industries in this State. The trunk makers are located in the large cities, so as to be in touch with the greatest demand. Basswood, the favorite wood for trunk boxes, furnishes about three-fourths of all the material the Ohio trunk makers use. It works easily, holds its shape well, and the fact that it is quite strong for its weight more than any other quality enhances its value for this line of manufacture. It is very white but inasmuch as little, if any, of the wood is visible in the finished product, being covered with leather, cloth or metal, the figure or color of it is not essential. Veneers are now

largely employed in this industry for the better grades of trunks and are growing in favor. They are used three or four ply, securing strength in many cases great enough to do away with slats and at the same time reducing the weight below that of solid lumber. The trunk manufacturer does not buy veneer and make the panels. He buys them already glued together and when lumber is used it is purchased already resawed to proper thickness.

White elm and white and black ash are utilized for slats because they are strong, will resist abrasion and add stiffness and protection to the box so that it will stand hard knocks. For the trays and inside compartments a light wood is required, and basswood, cottonwood, and yellow poplar were the ones called for. Birch and mahogany in small quantities only find service for the exposed parts of wardrobe trunks which are used as an article of furniture when not in transit.

TABLE LVII. Trunks and valises

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio	Grown out of Ohio
	Feet b. m.	Percent			Feet b. m.	Feet b. m.
Basswood	3,038,340	73.26	$ 24.73	$ 75,149	18,000	3,020,340
White elm	760,000	18.33	23.91	18,175	310,000	450,000
Shortleaf pine	200,000	4.82	30.00	6,000	.....	200,000
Chestnut	100,000	2.41	35.00	3,500	100,000	.....
White ash	23,000	.56	34.35	790	23,000	.....
Cottonwood	10,000	.24	32.00	320	10,000	.....
Yellow poplar	10,000	.24	32.00	320	.....	10,000
Red gum	3,500	.08	34.86	122	.....	3,500
Birch	1,500	.04	114.67	172	.....	1,500
Hickory	500	.01	26.00	13	500	.....
Mahogany	500	.01	150.00	75	.....	.....
Total	4,147,340	100.00	$ 25.23	$104,636	461,500	3,685,840

LAUNDRY APPLIANCES

Ten woods, aggregating 6,271,000 feet are reported for the manufacture of washing machines and washboards. None of the other laundry accessories were found being made in Ohio. The largest portion of the material required was for washing machines going into both the kinds used for domestic purposes and those forming the important part of steam laundry equipment. The most modern domestic machines are propelled by electric power, purchasable with a small motor attached and ready to connect with any electric light socket convenient. But those propelled by hand costing less are manufactured in the greatest numbers. Washing machines are of various designs and shapes, some in box form, some are made with staves like a wash tub and conical shape, and others are cylindrical. The last named are the design of those

used in laundries, and of late in their manufacture metal has begun to replace wood. All washers are lined with a corrugated surface called rubs. Though these are often made of wood, glass and metal are sometimes used. Cypress and cottonwood are considered best adapted for this purpose. More than any other wood cypress answers for the washing machine bodies because it is less liable to warp in situations of alternating moisture and dryness, Clothes are turned over in the washers by beaters or agitators that are made of some strong hardwood, usually beech or maple. For the supports or legs, cottonwood, cypress and longleaf pine served.

For washboards the manufacturers require woods that are white or light in color suitable for stenciling the upper part called print boards. Basswood, cottonwood and yellow poplar met this use in Ohio, and went also for the top pieces. The sides or posts and backs were made from beech and cottonwood. The rubbing surface was at one time made of wood, but now metal or glass has entirely taken its place. For the grooved pieces holding the rubs, beech supplied the demand.

TABLE LVIII. Laundry appliances

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
Cypress	3,084,000	77.08	$28.78	$ 88,760	.....	3,084,000
Longleaf pine	275,000	6.87	30.00	8,250	.....	275,000
Sugar maple	220,000	5.50	29.54	6,500	10,000	210,000
White oak	135,000	3.37	36.67	4,950	.....	135,000
Douglas fir	102,000	2.55	35.00	3,570	.....	102,000
Red oak	75,000	1.88	30.00	2,250	.....	75,000
Yellow poplar	40,000	1.00	25.00	1,000	20,000	20,000
Cottonwood	30,000	.75	24.00	720	15,000	15,000
Basswood	20,000	.50	28.00	560	10,000	10,000
Beech	20,000	.50	22.00	440	10,000	10,000
Total	4,001,000	100.00	$29.24	$117,000	65,000	3,936,000

SHIP AND BOAT BUILDING

Ohio, with its many miles of lake frontage on the north, and along the Ohio River on the south, strange to say requires relatively little lumber for boat building. Although there are large ship yards at the main harbors on the lake, very little wood enters into the construction of lake steamers, steel having almost entirely replaced wood. The boats along the Ohio River are largely built of wood, but the demand for lumber in Ohio, except for repair work, is very light. It can well be said that with the exception of a small amount of material for canvass skiffs, launches and sail boats, the principal wood consumption is for cabin and deck work on the lake boats, and for tugs, barges and scows for river transportation.

At one time Ohio relied mainly on its waterways for transportation. Before the railroads traversed the State north and south, which was long after lines running east and west had been in operation, there were two canals, one running from Toledo to Cincinnati in the western part of the State, and the other connecting the river and lake in the eastern part. These two canals established direct water transportation from the Great Lakes to all points on the Ohio and Mississippi Rivers. During that period the occupation of boat building in the number of establishments and the amount of wood used was one of the important enterprises in the State; and although navigation is not so active now as formerly a few establishments remain along the Ohio River that are still important industries and are in active operation.

Table LIX shows 22 woods were employed to meet the demands of the boat builders. The long list is due to the large number of uses they serve, which often requires wood of special qualities and and in some cases of extra long dimensions. White oak leads the list and furnished over one-quarter of the total. A major portion of the boat material went for building steam packets, barges and other river crafts. For the framework of hulls, such as keelsons, keels, keel blocks, rails and head logs, besides guards, carlings, and bulkheads, white oak, yellow pine and Douglas fir furnished the material. The latter was employed principally for keelsons in large boats where long lengths were necessary, combined with strength and stiffness and for which longleaf yellow pine and white oak in sufficient lengths were difficult and probably too expensive to secure. For certain barges the keelsons are ordered unspliced and as much as 60-foot timbers were required.

Sugar maple is employed for deck flooring because it is hard and close-grained and also it can be holly-stoned and made to appear whiter than almost any other domestic wood. White pine was the principal siding wood for large boats and it also served with yellow pine, Douglas fir, white oak, and yellow poplar for parts of the superstructure and decking. Yellow poplar and oak were the principal woods for the interior finish of cabins, the former for painted work and the latter in the natural finish. Cypress is not as important a species for ship building in Ohio as in other states. It went principally for boat boards in motor boats and skiffs. Hickory's only demand was for fenders and spuds, while locust was called on owing to its strengh and durable qualities for kevels, bits, tree nails and tillers of sail boats. Red cedar, southern white cedar from Virginia commonly known as juniper, and white cedar or arborvitae from Wisconsin, were purchased for canoe and skiff siding and in this

respect served with spruce. Oak and mahogany met the demand for trim, guards and rails of canoes. In canvas folding boats the framework was of white ash, the floors of cypress and spruce. Cherry and mahogany were reported for pilot wheels and white ash and spruce were used for boat oars and canoe paddles.

TABLE LIX. Ship and boat building

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
White oak	1 012,000	30.46	$ 40.10	$ 40,648	88,000	924,000
Douglas fir	431,000	12.97	36.43	15,703	.....	431,000
White pine	344,000	10.35	40.06	13,780	.....	344,000
Western red cedar	235,000	7.07	27.45	6,450	.....	235,000
Longleaf pine	229 500	6.91	34.49	7,916	.....	229,500
White ash	203,000	6.11	35.22	7,150	203,000	.....
Spruce	166,000	5.00	36.02	5,980	2,000	164,000
Red oak	150,000	4.51	40.00	6,000	.....	150,000
Bur oak	100,000	3.01	30.00	3,000	.....	100,000
Hemlock	100,000	3.01	30.00	3,000	.....	100 000
Beech	51,500	1.55	20.29	1,045	1,500	50,000
White cedar (northern)	51,000	1.54	99.71	5,085	.....	51,000
Yellow poplar	50,500	1.52	45.25	2,285	10,000	40,500
Red cedar	49,660	1.49	38.68	1,921	.....	49,660
Mahogany	49,000	1.48	108.16	5,300	.....	49,000
Cypress	41,000	1.23	57.32	2,350	.....	41,000
Cherry	26,000	.78	88.46	2,300	1,000	25,000
Shortleaf pine	18,000	.54	27.00	486	.....	18,000
Sugar maple	10,000	.30	30.00	300	10,000	.....
Locust	2,000	.06	40.00	80	1,000	1,000
Hickory	2,000	.06	37.50	75	1,000	1,000
Spanish cedar	1 500	.05	95.33	143	.....	1,500
Total	3,322,660	100.00	$ 39.43	$130,997	317,500	3 005,160

FRAMES AND MOLDINGS

In segregating the industries care was taken not to include under this table the woods employed in the manufacture of house moldings as turned out by planing mills, so this industry deals entirely with the manufacture of moldings for picture frames, highly carved moldings for high grade cabinet work, show cases, etc. The fourteen woods included in the list in the following table, representing a total of 2,809,961 board feet, were carefully selected by the manufacturer for special purposes, depending upon the desirability of the wood; and the average price paid per thousand feet, $42.01, indicates that the best grades of lumber are desired and that cheapness is not one of the prime considerations. The lowest average price paid was for yellow poplar and chestnut, and the highest, $115.02, for mahogany strips, which, strange to say, is the only foreign wood reported. With the advanced methods of kiln drying lumber, red gum formerly unheard of in this line of manufacture is now a satisfactory material and leads the list according to amounts.

When finished in its natural color red gum has a beautiful appearance, but it also takes stain well and a large part of it is finished to imitate mahogany, oak or walnut. For gilt and burnished gold finish and other enameled moldings yellow poplar and basswood are employed because of their quality to hold paint and retain their shape. Buckeye also was used for this purpose. White and red oak, ash and chestnut were as a rule finished in the natural color with oils and varnish. Birch, like red gum, goes into imitation mahogany unless it has a burly or mottled figure, when it goes into the natural finish.

TABLE LX. Frames and molding

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
Red gum	1,005,000	35.77	$40.15	$ 40,350	.....	1,005,000
Basswood	572,200	20.36	35.72	20,441	50,000	522,200
White oak	389,325	13.86	49.05	19,098	131,000	258,325
Yellow poplar	271,251	9.65	34.47	9,350	.....	271,251
Buckeye	214,000	7.62	35.61	7,620	214,000	.....
Red oak	158,000	5.62	49.25	7,782	.....	158,000
Birch	105,200	3.74	87.64	9,220	.....	105,200
Shortleaf pine	50,000	1.78	30.00	1,500	.....	50,000
Chestnut	23,400	.83	41.03	960	.....	23,400
Mahogany	10,250	.36	115.02	1,179	.....	10,250
White ash	9,100	.33	47.58	433	1,100	8,000
Black walnut	1,390	.05	38.80	97	1,390	.....
Beech	595	.02	30.25	18	.....	595
Sugar maple	250	.01	36.00	9	250	.....
Total	2,809,961	100.00	$42.01	$118,057	397,740	2,412,221

BRUSHES

Of the 2,383,694 feet of wood utilized for brush blocks, beech constitutes much the larger part, the percentage being 88.38 of the whole. Being perhaps the cheapest hardwood, it is admirably suited for this purpose because it bores well without splitting, is strong, and does not check or warp easily, besides, being light in color, it bears a pleasing appearance. Maple is equally as suitable and in quantity follows beech but it is higher priced. Very little of the woods reported were obtained in Ohio. The principal supplies came from Michigan and Pennsylvania. This industry is confined mainly to the production of cheap brush blocks, such as are used for making scrubbing, dustpan, feather dusters, stable and street brushes, also whitewash or kalsomining, and small brushes for cleansing the hands and nails. No high priced woods were reported, such as holly, ebony, mahogany or dogwood, which are used elsewhere

for hair brushes, hat and jewelry brushes, but those demanded other than beech and maple were white oak, yellow poplar, cypress, sycamore, hickory and elm used as follows:

TABLE LXI. Brushes

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
Beech	2,383,694	88.38	$18.02	$42,960	12,000	2,371,694
Sugar maple	80,417	2.99	28.46	2,289	75,000	5,417
White oak	75,000	2.78	25.00	1,875	75,000	.....
White elm	65,000	2.41	30.00	1,950	.....	65,000
Cypress	30,000	1.11	60.00	1,800	.....	30,000
Hickory	30,000	1.11	50.00	1,500	15,000	15,000
Yellow poplar	30,000	1.11	40.00	1,200	.....	30,000
Sycamore	3,000	.11	16.00	48	30,000	.....
Total	2,697,111	100.00	$19.88	$53,622	180,000	2,517,111

PUMPS

The substitution of galvanized and metal pumps for wooden ones has reduced the demand for wood to only a small portion of what formerly was used in this line of manufacturing. The kinds of pumps manufactured are well, cistern and barrel pumps. Five woods were called for in their making, yellow poplar supplying more than one-half or 59.65 percent. This is one of the few woods that is suitable for the liquor logs. Cucumber, similar to it, is probably most largely used, but not reported in Ohio. The compact fibre of these woods, the straight grain, and their quality of softness enable them to be bored easily, and not being as heavy as other woods are more desirable when hung in place in the well. For barrel pumps poplar was the only material reported, but its exact use was not mentioned. Shortleaf pine, cypress and white pine were made into pump boxes for chain and bucket pumps. For well pump stocks, cotton gum or tupelo was the principal wood and for pump poles, longleaf pine. Pump handles made from hickory, ash and maple have been referred to under the handle industry.

TABLE LXII. Pumps

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
Yellow poplar	988,000	59.65	$48.86	$48,274	10,000	978,000
Shortleaf pine	323,230	19.52	21.29	6,882	.....	323,230
Cotton gum	300,000	18.11	40.00	12,000	.....	300,000
White pine	40,000	2.42	22.50	900	.....	40,000
Cypress	5,000	.30	40.00	200	.....	5,000
Total	1 656 230	100.00	$41.21	$68,256	10,000	1,646,230

PLAYGROUND EQUIPMENT

Lawn and porch swings are the only products listed under this heading. Four woods are reported at an average cost lower than in any industry table of this report. The oaks, both red and white, furnish over three-fourths of the wood because their inherent qualities of strength, hardness and durability when exposed fit them for this line of manufacture. White elm is usually used for the bent parts and beech in small amounts for the bottoms or platforms of lawn swings.

TABLE LXIII. Equipment, playground

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
White oak	600,000	41.38	$15.00	$9,000	100,000	500,000
Red oak	500,000	34.48	13.00	6,500	.....	500,000
White elm	250,000	17.24	18.80	4,700	125,000	125,000
Beech	100,000	6.90	20.00	2,000	100,000	.....
Total	1,450 000	100.00	$15.31	$22,200	325,000	1,125,000

PATTERNS AND FLASKS

Table LXIV represents the lumber required by foundries for castings. Flasks, templets and patterns indicate the uses to which this material is put. Foundry flasks are rough boxes or frames holding the molded sand into which the hot liquid metal is poured. It would be naturally expected that this lumber should be as fire resisting as possible, but in Ohio the foundrymen apparently lay little attention to this detail. The table shows that a variety of woods, usually those to be gotten near at hand are the kinds employed, with the result that the hot metal heats the sand to a temperature where the wood blazes. Notwithstanding the fact that water is dashed on the blaze as soon as it is discovered, owing to frequent firing the flask is soon made unfit for use, thereby requiring the foundrymen to consume quite a large amount of wood for this purpose. If the flask material could be treated or coated with a fire proofing chemical, or if the wood used were redwood, which is the most difficult of all domestic woods to ignite, the additional cost would doubtless prove an economy. White pine is used in larger quantities in Ohio than any other wood for flask material and it serves with shortleaf pine, longleaf pine, hemlock, elm and silver maple.

For patterns white pine is probably superior to any other wood. Its suitability is due to its being more easily worked, close-grained with obscure figure, and not liable to warp or shrink. The increasing cost of this wood, especially in the upper grades and for wide

stock, usually desired for patterns, long ago created a demand for a substitute, but so far none have been found thoroughly practical. It is quite surprising to note the small quantity of western white pine called on for patterns, that is the true white pine cut in the Rocky Mountain states, and the large amount of sugar pine used which in most of its qualities closely resembles the white pine. When durable patterns are required to stand the wear, like those tha tare used over and over again, a harder wood than white pine, not liable to warp or check, is adopted. Mahogany, cherry and butternut are the most widely used. When this kind of pattern is quite large, the entire pattern is not made of the expensive wood, only the outside, the filler being of a cheaper wood like white pine, yellow poplar, basswood or red gum. Sugar maple in many of its qualities is a suitable hardwood, but owing to its tendency to shrink and curl its use is limited to only small quantities.

The material upon which the pattern rests before being removed from the flasks is called templets. Like the flasks, lower grades of lumber are required for these than are used for patterns, and in Ohio white pine and yellow poplar answer for this purpose.

TABLE LXIV. Patterns and flasks

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
White pine	1,024,700	69.74	$ 56.37	$57,761	25,000	999,700
Sugar pine	90,000	6.13	61.64	5,550	.....	90,000
Yellow poplar	90,000	6.13	35.00	3,150	.....	90,000
Shortleaf pine	75,000	5.10	29.00	2,175	.....	75,000
Longleaf pine	55,000	3.74	24.54	1,350	.....	55,000
Sugar maple	30,500	2.08	21.31	650	30,000	500
Hemlock	30,000	2.04	22.00	660	.....	30,000
White elm	25,000	1.70	20.00	500	25,000	.....
Butternut	16,000	1.09	49.63	794	13,000	3,000
Mahogany	15,000	1.02	141.34	2,120	.....	15,000
Basswood	10,000	.68	35.00	350	10,000	.....
Cherry	5,000	.34	74.00	352	3,000	2,000
Silver maple	2,000	.14	85.00	170	2,000	.....
Red gum	1,000	.07	45.00	45	.....	1,000
Total	1,469,200	100.00	$51.47	$75,627	108,000	1,361,200

PULLEYS AND CONVEYORS

Belt pulleys have a number of parts, but only two woods, yellow poplar and sugar maple, were called on to supply the material. The former answered for the rim pieces and the latter for hubs and braces. The rope pulley is a one-piece product, and hard maple and beech, the first in larger quantities, were the woods reported.

In grain and other conveyor apparatus the rollers or pulleys were of red gum and ash and the numerous other parts accounted for the rest of the woods listed in Table LXV.

TABLE LXV. Pulleys and conveyors

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
Yellow poplar	280,000	31.37	$22.71	$6,360	.....	280,000
Sugar maple	255,000	28.57	23.31	5,945	100,000	155,000
Beech	100,000	11.21	20.00	2,000	100,000	.....
White oak	100,000	11.21	33.00	3,300	.....	100,000
Longleaf pine	80,000	8.96	30.00	2,400	.....	80,000
White pine	35,000	3.92	35.00	1,225	.....	35,000
Red gum	22,500	2.52	14.93	336	22,500	.....
Black ash	20,000	2.24	30.00	600	20,000	.....
Total	892,500	100.00	$24.84	$22,166	242,500	650,000

SPORTING GOODS

The shafts of golf sticks and pool and billiard tables are the only commodities made in Ohio that come under the classification of sporting goods. Resiliency, shock resisting quality and strength are the prime considerations for the golf stick material and hickory having them combined to a greater degree than any other wood was the only one demanded by the Ohio manufacturers. Rough squares 1x1 inch x 36 to 44 inch was the form in which the material was purchased. The heads of driving clubs used in playing golf are made of wood, principally persimmon and to a less extent of dogwood. These heads are manufactured at mills in other States who make a specialty of them and brought to Ohio manufactured and ready to be assembled.

Billiard and pool tables are made of a variety of woods. The frames are of yellow poplar and chestnut. The latter is probably more of a favorite in that it combines the qualities of moderate strength, light weight, cheapness and a special affinity for glue. The finish is usually veneer, quarter-sawed oak, birch, mahogany and other expensive cabinet woods. The rail to which the rubber cushions are attached is subjected to great strain and therefore should be a wood that holds its shape well and that has remarkable strength. Ash excellently fulfills these conditions and was the only material called for. The massive legs of billiard tables, like piano legs, are largely red oak, owing to the strength of the wood and its suitability as a backing for veneer.

TABLE LXVI. Sporting and athletic goods

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
Hickory	511,000	63.01	$81.14	$41,465	55,000	456,000
Chestnut	80,000	9.86	27.75	2,220	.....	80,000
White oak	80,000	9.86	67.81	5,425	.....	80,000
Yellow poplar	80,000	9.86	22.63	1,810	.....	80,000
Red oak	30,000	3.70	40.00	1,200	.....	30,000
White ash	20,000	2.47	36.00	720	.....	20,000
Mahogany	10,000	1.24	100.00	1,000	.....	10,000
Total	811,000	100.00	$66.39	$53,840	55,000	756,000

INSTRUMENTS, PROFESSIONAL AND SCIENTIFIC

Besides tables and the straight-edge rulers used by draftsmen the other products manufactured by the factories considered under this heading are confined principally to tools used by carpenters, paper hangers, tinners and foundrymen. Eight woods were reported, totaling 604,000 board feet. Basswood was listed in the greatest amount, and was employed largely for the manufacture of tops of drawing tables, and paste boards for paper hangers. The trestle parts or the collapsible stands upon which these boards rest were made of sugar maple and Douglas fir, the latter shipped from Wyoming. Hickory and applewood were turned into mallets for tinners and foundrymen, including the handles. The mallet material was obtained in rough squares 3x3 inch or 4x4 inch, random lengths. Beech, on account of its close grain and its susceptibility to wear smooth, went into plane stocks. It served with applewood employed only in small amounts. The latter was reported in no other industry of this report. Carpenters' hand screws called for sugar maple and hickory, the former for the jaws and the latter for the screws or spindles, while bench screws for carpenters' vises were made of sugar maple. It will be of interest to notice that two of the eight woods listed in Table LXVII were brought from the Pacific coast, redwood and sugar pine. They were selected and used in this industry for making straight edges, because they do not warp or twist and are easy to work.

TABLE LXVII. Instruments, professional and scientific

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio	Grown out of Ohio
	Feet b. m.	Percent			Feet b. m.	Feet b. m.
Basswood	150,000	24.83	$39.00	$5,850	.....	150,000
Sugar maple	130,000	21.52	27.23	3,540	50,000	80,000
Hickory	125,000	20.70	32.80	4,100	110,000	15,000
Beech	100,000	16.56	22.00	2,200	75,000	25,000
Douglas fir	30,000	4.97	40.00	1,200	.....	30,000
Redwood	30,000	4.97	38.00	1,740	.....	30,000
Applewood	24,000	3.97	20.00	480	24,000	.....
Sugar pine	15,000	2.48	60.00	900	.....	15,000
Total	604,000	100.00	$33.14	$20,010	259,000	345,000

ELEVATORS

Next to the last in the list of industries, from the standpoint of lumber used, are elevators. The manufacturers report 583,000 board feet, six woods representing the amount. Steel to so large an extent has replaced wood in elevator construction that wood is not an important factor compared to what it used to be. It is an exception today to see the old time wooden elevator car in operation. The woods the Ohio manufacturers demand go into dumb waiters, hand elevators and the wooden parts of power elevators, both passenger and freight. Longleaf pine answers principally for guides, hard maple for the platforms and tracks, shortleaf pine for the gates, and white oak and maple for bottoms or flooring. One-fifth of the wood reported was obtained in the State.

TABLE LXVIII. Elevators

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio	Grown out of Ohio
	Feet b. m.	Percent			Feet b. m.	Feet b. m.
Longleaf pine	264,000	44.90	$19.68	$5,196	.....	264,000
Sugar maple	250,000	42.52	30.00	7,500	50,000	200,000
White elm	30,000	5.10	25.00	750	30,000	.....
White oak	24,000	4.08	37.08	890	24,000	.....
Yellow poplar	15,000	2.55	32.67	490	5,000	10,000
Red oak	5,000	.85	30.00	150	5,000	.....
Total	588,000	100.00	$25.47	$14,976	114,000	474,000

SADDLES AND HARNESS

Stirrups are the principal commodity included in the table under this heading. Elm, red and white oak, basswood and hackberry were the woods furnishing the raw material, purchased in form of bolts. Elm was the favorite as to quantity, but red, white and bur oak were used for the better grades of stirrups. Basswood served principally for the upper part called the head or neck blocks while

hackberry went for stirrups of boys' and for cheaper grades of men's saddles. Hames were the only product reported to be included in this classification. About 350 M feet of material is annually demanded, purchased in squares the size of which were 2½x2½x30 and 2¾x2¾x32. In Ohio as in other states ash is the most popular hame wood. Other species contributing were beech, sugar maple and white oak.

TABLE LXIX. Saddles and harness

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
Cork elm	160,000	28.83	$22.50	$3,600	.....	160,000
Beech	90,000	16.22	30.00	2,700	70,000	20,000
Red oak	61,000	10.99	18.15	1,107	51,000	10,000
Black ash	60,000	10 81	50.00	3,000	.....	60,000
White ash	50,000	9.01	30.00	1,500	30,000	20,000
Basswood	41,000	7.39	22.80	935	34,000	7,000
Sugar maple	30,000	5.41	30.00	900	20,000	10,000
White oak	26,000	4.68	33.92	882	16,000	10,000
Hackberry	25,000	4.50	20.00	500	25,000	.....
White elm	12,000	2.16	22.00	264	12,000	.....
Total	555,000	100.00	$27.73	$15,388	258,000	297,000

Fig. 25. Evolution of the shoe last. Rough block partly turned and finished product.

MISCELLANEOUS

When collecting the data for this report the Forest Service assured the Ohio manufacturers that in the compilations, information of individual concerns would not be revealed. To make this rule effective when there were less than three manufacturers making the same or similar commodities, they were not grouped into a separate industry as was the case when there were three or more. Instead of discarding the data in these cases the reports were grouped indiscriminately under a general heading. "Miscellaneous" and Table LXX following presents these statistics.

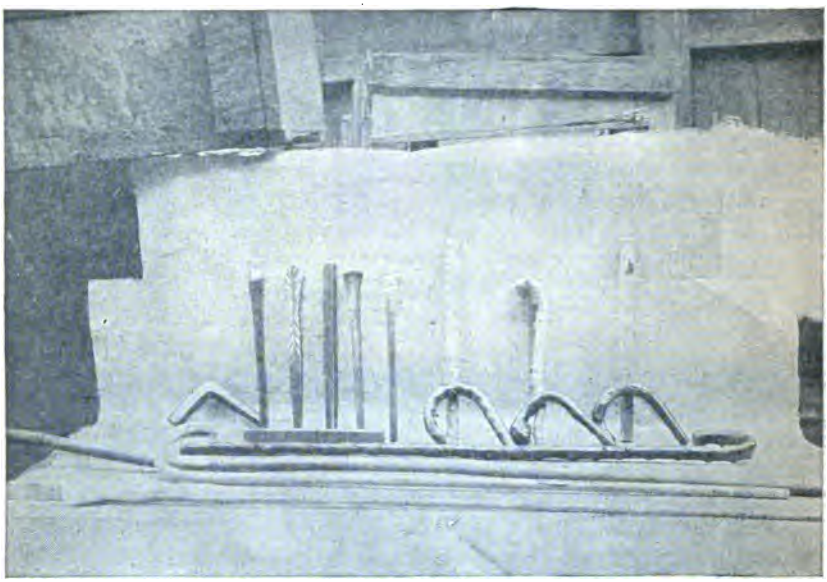


Fig. 26. Showing the raw material and the products of an umbrella handle and cane factory.

Artificial limb manufacturers used only one wood, willow, and the entire supply was cut outside the State. Umbrella racks made mostly of metal have wooden frames; ash and white oak supplied the material. Hard maple answered for looms of silk and textile mills, the sapwood of red gum for curtain poles and black walnut for gun stocks. The making of coffee mills required yellow poplar and red gum, and money drawers, yellow poplar and white oak, the former for the inside compartments, and the latter for the exterior. In the breweries to clarify and filter beer, chips cut from beech are frequently employed and are called brewers' shavings. The manufacture of these in Ohio is not a large industry but is worthy of mention.

On the other hand, the making of cigar molds, cigar makers' boards and presses is quite an extensive line of manufacturing in the quantity of wood reported. The molds are made of yellow poplar, basswood, maple and beech, while for presses and cigar boards, high grade hard maple alone supplied the demand. A large amount of wood in Ohio is converted annually into shoe lasts, trees and forms. The two former were practically all made from sugar maple and high grades were used, for the latter basswood and to a small extent yellow poplar met the demand. The only other product to be mentioned is farm gates made from red and white oak.

TABLE LXX. Miscellaneous.

Kind of wood	Quantity used annually		Average cost per 1,000 ft.	Total cost f. o. b. factory	Grown in Ohio Feet b. m.	Grown out of Ohio Feet b. m.
	Feet b. m.	Percent				
Yellow poplar	2,135,000	27.55	$21.53	$45,975	1,500,000	635,000
White oak	1,608,000	20.75	33.41	53,725	1,508,000	100,000
Red oak	950,000	12.26	25.16	23,900	850,000	100,000
Basswood	630,000	8.13	24.13	15,200	250,000	380,000
Sugar maple	610,000	7.87	51.43	31,375	100,000	510,000
Black walnut	350,000	4.52	134.29	47,000	350,000	.....
Chestnut	350,000	4.52	18.00	6,300	350,000	.....
Beech	318,000	4.11	19.00	6,049	103,350	215,000
Red gum	265,000	3.42	20.83	5,520	.....	265,000
White ash	222,000	2.86	14.28	3,180	2,000	220,000
Sycamore	150,000	1.93	18.00	2,700	150,000	.....
Buckeye	75,000	.97	21.00	1,575	.....	75,000
Shortleaf pine	50,000	.64	23.50	1,175	.....	50,000
Willow	20,000	.26	125.00	2,500	7,000	13,000
Redwood	16,000	.21	54.00	864	.....	16,000
Total	7,749,350	100.00	$31.88	$247,028	5,170,350	2,579,000

USES OF WOOD IN OHIO

ARBORVITAE (WHITE CEDAR)

Boat parts (row)
Boxes
Crating
Canoes
Oars
Pails
Siding (motor boats)
Shingles

APPLEWOOD

Mallets
Planes

BALM OF GILEAD

Boxes
Crating

BASSWOOD

Agricultural implements (hullers)
Altars
Apparatus parts (electric)
Backings (furniture)
Backs (organ)
Baseboards
Baskets (fruit and vegetable)
Bellows (organ)
Bookcases (inside work)
Boxes
Breadboards
Bureaus (inside work)
Cabinets (kitchen)
Candy pails
Car construction
Car repairing
Casings (building)
China closets (interior work)
Church pews
Circus seats
Cigar boxes
Cleats (organ)
Clothes bars
Commodes
Coops (poultry)
Cornice
Corn shellers
Couches (box)
Crating
Cupboards
Desks (school)
Drawer bottoms
Fans (electric)
Feed mills
File cases
Fixtures (bar)
Fixtures (barber shop)
Fixtures (store and office)
Flag poles
Frames (couches)
Frames (davenports)
Frames (hand mirror)
Frames (lounges)
Furniture (church)
Furniture (interior)
Gameboards
Games of chance
Go-carts
Grain separators (agricultural implements)
Guitars
Handles
Hayloader parts
Hoppers (fruit and vegetable)
Incubators (bodies)
Ironing boards
Interior finish (building)
Ladders (extension)
Laundry machinery
Lodge furniture
Machinery construction
Millwork
Moldings (casket)
Music cabinets (interior)
Organ cases (folding organ)
Organ frames
Parlor furniture (frames)
Patterns
Pasteboards
Picture molding
Pipe organs (interior parts)
Refrigerators
Sample cases
Seeder boxes (farm implements)
Sheathing (building)
Siding (house)
Signboards
Staves
Stirrups (head blocks)
Stirrups (neck blocks)
Swing seats
Tables
Threshing machines
Toys
Trunks
Vehicle bodies
Veneer cases (piano)
Washboards
Washing machines

BEECH

Agricultural implements (parts)
Backs (washboard)
Basket parts
Beds (folding)
Boats
Barges
Bookcases (interior)
Boxes
Box shooks
Bottoms (pails)
Braces
Brush backs
Brush blocks
Candy pails
Car repairing
Chairs (rockers)
Chair stock
Cider mills
Churns
Crating
Drills (farm implements)
Ensilage cutters
Feed cutters
Fixtures (office)
Furniture (interior work)
Frames (grindstone)
Hames (wood)
Handles
Handles (barrow)
Handles (broom)
Handles (lawn mower)
Handles (machinery)
Handles (wrench)
Heading
Interior finish
Neck yokes (farm implements)
Neck yokes (wagon)
Piano chairs
Piano stools
Planing mill products
Press parts
Rat traps
Rockers (chair)
Seeders (farm implements)
Sideboards (interior)
Sills
Singletrees (farm implements)
Skids
Toys
Trunks

BIRD'S EYE MAPLE

Seats (water closets)
Tanks (water closets)
Furniture
Fixtures

BLACK ASH

Agricultural implements
Automobile frames
Box shooks
Car repairing
Colonial columns
Churns
Furniture (interior)
Furniture (exterior)
Handles (garden tools)
Handles (small tools)
Hayloader parts
Mirrors
Piano tops
Plane bodies
Rims (truck)
Refrigerators
Sides (washboards)
Sills (vehicle)
Singletrees
Trunk slats
Vehicle bodies
Wagon cleats
Wheelbarrows
Wheels

BLACK LOCUST

Boat parts
Wagon hubs

BUCKEYE

Crating
Picture molding
Signboards

BUTTERNUT

Altars (church)
Cabinet work
Church furniture
Fixtures (store and office)
Fixtures
Lodge furniture
Machinery construction
Patterns
Piano cases

CHERRY

Brick molds
Cabin parts
Cabinet work
Car repairing
Car construction (interior finish)
Fixtures (bar)
Fixtures (display windows)
Fixtures (store and office)
Flooring
Furniture
Furniture (church)
Interior finish
Lodge furniture
Machinery construction
Motor boats (deck trimmings)
Organs (cabinet)
Organs (pipe)
Patterns
Piano parts
Picture moldings
Pilot wheels
Planing mill products
Seats (water closets)
Tanks (water closets)

CHESTNUT

Agricultural implements (parts)
Backs (piano)
Barber furniture
Bar fixtures
Boxes
Box shooks
Car construction (backing)
Car repairing
Case recorders (physicians)
Cases (veneer)
Cash registers
Casings
Caskets
Crating
Doors
Drawer sides
Feed cutter tables
Fixtures (bank)
Fixtures (barber shop)
Frames (upholstered furniture)
Furniture
Mantels
Panel cores (veneer doors)
Panels (veneer)
Piano cases
Piano parts
Picture moldings
Sideboards (built in)
Trunk trays

CIRCASSIAN WALNUT

Cabinet work
Car repairing
Furniture
Fixtures
Parlor rockers
Piano cases
Piano veneer
Tables (parlor)
Wind shields (automobile)

COTTONWOOD

Agricultural implements
Backs (washboards)
Baskets
Berry boxes
Bevel siding
Bookcases (inside work)
Boxboards (heavy vehicles)
Boxes
Boxes (manure spreaders)
Box shooks
Buggy backs
Car construction (rafters)
Car repairing parts
Carts
China closets
Clothboards
Commodes
Corn binder parts
Corn shellers
Cornice
Cultivator parts
Cupboards (kitchen)
Crating
Drawers
Drill boxes (farm implements)
Drills (farm implements)
Dropsiding
Egg cases
Ensilage cutters
Eveners (harrow)
Fixtures (bar)
Fixtures (store and office)
Fodder shredders
Frames (canopy)
Furniture (inside work)
Interior trimmings
Ironing-boards
Kitchen cabinets
Manure spreaders (beds)
Millwork
Music cabinets (inside work)
Packages (fruit and vegetable)
Panels (light vehicle bodies)
Panels (spring wagon bodies)
Piano cases (veneer cases)
Samples cases
Seeders, boxes (farm implements)
Self-feeders (threshing machines)
Separator sides (threshers)
Shelving
Shipping cases (butter)
Siding (washboards)
Stacker parts (farm machinery)
Tables
Trunks
Vehicle bodies
Vehicle seat backs
Wheelbarrows

CUCUMBER

Agricultural implements (parts)
Crates (fruit and vegetable)
Staves (pail)
Doors

CYPRESS

Altars
Baseboards
Boat floors
Boat parts (sail)
Blinds
Cabinet work (unexposed)
Carvings
Caskets
Cisterns
Colonades
Columns (porches)
Cornice
Door frames
Doors
Drawer bottoms
Drawers (ends and sides)
Dressers
Electric cars (interior trimmings)
Exterior trimmings
Finish (boats)
Fixtures (banks)
Fixtures (soda fountain)
Fixtures (store and office)
Flooring
Frames
Frames (window tents)
Hay baler parts
Ice pans
Incubator parts
Lodge furniture
Mantels
Millwork
Motor boats
Pails
Panels (delivery wagon)
Planing mill products
Porch work
Pumps
Refrigerators
Sash
Screen doors
Siding (heavy vehicle bodies)
Silos
Skiffs
Stairwork
Store fronts
Tanks
Threshing machine parts
Turnings
Washing machines
Window frames
Window screens

DONCELLA

Sash frames (automobiles)

DOUGLAS FIR

Agricultural machinery
Boats
Barges
Car construction
Columns (porches)
Door frames
Doors
Dredge parts
Frames (machinery parts)
Frames (outside trimmings)
Interior finish
Ladders (extension)
Machinery construction
Millwork
Organ bellows
Organ pipes
Porch work
Refrigerators
Tanks
Trestles
Seat stringers
Silos
Washing machines
Windmill parts

EBONY

Musical instruments

HACKBERRY

Stirrups

HEMLOCK

Barges
Boats (parts)
Boxes
Box shooks
Building material
Car repairing
Car construction
Crating
Farm implements
Flasks
Framing
Piano cases
Refrigerators
Siding
Signboards
Skidding
Tanks
Well machines (frames)
Wood conductors

HICKORY

Agricultural implements (hullers)
Axles (light vehicles)
Binder parts
Bottoms (wagon boxes)
Cabinet work
Calking hammers
Car repairing
Car construction
Carvings
Chairs
Corn binder parts
Crossbars (light vehicles)
Cultivator handles
Doubletrees
Eveners (farm implements)
Felloes
Freight cars
Gear woods (light vehicles)
Golf sticks (handles)
Hammer handles
Handles
Handles (broom)
Handles (edge tools)
Hay baler parts
Hay loader parts
Header parts
Ladders
Ladder rungs
Machinery handles
Mallets
Manure spreader parts
Maul handles
Moulds (brick)
Neck yokes (implement)
Neck yokes (plows)
Neck yokes (vehicles)
Patterns
Pins
Picture moulding
Pick handles
Pitmans (farm implements)
Plow beams
Plow handles
Poles (light vehicle)
Rake teeth
Revolving rakes
Rims (automobile wheels)
Rims (vehicle wheels)
Road-scrapers
Shafts (vehicle)
Singletrees
Sledge handles
Small tool handles
Spokes (automobile)
Spokes (light and heavy vehicles)
Spring bars (light vehicles)
Threshing machines
Tongues (light vehicles)
Tongues (wagon)
Tongues (wheel scrapers)
Trapeze (gymnasium)
Trucks
Trunk slats
Turnings
Wagon stock
Wagon jacks
Whiffletrees (vehicles)

JACK PINE

Sheathing

LOBLOLLY PINE

Boxes
Cases
Crating
Doors
Window frames

LONGLEAF YELLOW PINE

Agricultural implements (parts)
Balusters
Barges
Baseboards
Beef hoist beams
Boats
Bottoms (vehicles)
Boxes (tool)
Box shooks
Brackets (cornice)
Brackets (interior trimmings)
Cabinet work
Car construction (decking)
Car construction (flooring)
Car construction (framing)
Car repairing
Carriage timber
Ceiling
Colonades
Columns (porch)
Corn husker parts
Corn pickers
Cotton pickers
Cranes (flooring)
Crating
Cultivator parts
Derrick beams
Disc harrow parts
Door frames
Doors
Doors (railway box cars)
Drill boxes (farm implements)
Elevator guide posts
Elevators
Eveners (harrows)
Feed mills
Fixtures (laboratory)
Fixtures (office, cafe)
Flasks
Flooring
Flooring (scale platforms)
Frames (box cars)
Frames (saw mill)
Gears (heavy wagons)
Grain elevators
Hayloader parts
Hayracks
Hayrake parts
Heads (washing machines)
Hydaulic jacks (parts)
Inside finish
Ladders (extension)
Machinery construction
Millwork
Manure spreaders
Neck yokes
Panels (veneered)

Platforms (tank towers)
Planing mill products
Plow parts (gang)
Poles (farm implements)
Poles (wagon)
Posts (stairwork)
Press parts
Refrigerators
Screen doors
Seed-corn driers
Seeder boxes (farm implements)
Shoveling boards (farm wagons)
Sideboards (built in)
Side delving rakes
Signboards
Signs (advertising)
Silos
Stairwork
Staves (washing machines)
Sweeps (feed mills)
Tanks (acids)
Tank coverings
Threshing machines
Tongues (binders)
Tongues (cotton planters)
Tongues (manure spreaders)
Tongue (plows and cultivators)
Tongues (wagon)
Wagon dumps
Washing machines (hand)
Washing machines (hydraulic)
Well machinery
Window frames

MAHOGANY

Automobiles
Boats
Boat parts (row)
Bookcases (exterior work)
Bureaus (exterior work)
Cabinets
Cabinet work
Cabin parts
Cash registers
Car construction (finish)
Car repairing
Case recorders (physicians)
Caskets
Chair frames (upolstered)
Chairs (dining room)
Chairs (office)
Chairs, official (lodge room)
Chairs (rockers)
Coffins
Consoles
Desks
Doors
Finish (automobiles)
Finish (boats)
Finish (furniture bodies)
Fixtures (bank)
Fixtures (bar)
Fixtures (laboratory)
Fixtures (soda fountain)
Fixtures (store and office)
Furniture
Guitar bodies
Hallracks
Interior finish
Leaves, (table)
Mirror cases
Organ cases
Patterns (machine parts)
Piano cases
Piano chairs
Piano parts
Piano veneer
Picture mouldings
Plate racks
Pool tables
Rocker frames (upholstered furniture)
Seats (water closet)
Shells (drums)
Showcases
Stands
Tables (card)
Tables (dining)
Tables (extension)
Tables (library)
Tables (parlor)
Tanks (water closets)
Trunks

PADOUK (VERMILLION)

Furniture
Interior finish
Car construction

RED CEDAR

Boats
Cabinet work
Canoes
Cigar boxes
Chests (clothes)
Coffins
Cornice
Decking
Flasks
Frames
Furniture (exterior)
Interior trimming
Mop wringers
Organs
Patterns
Planing mill work
Planking (boat)
Pianos
Siding
Sheathing
Shingles
Washing machines

CORK ELM

Agricultural implements
Automobiles
Bentwood (vehicles)
Crating
Boxes
Doubletrees (plow and harrows)
Eveners (plow and harrow)
Feed cutters
Handles
Hay loader parts
Hounds (vehicles)
Hoppers
Hubs (light vehicle wheels)
Interior finish
Machine handles
Platforms
Posts (seat)
Rims (trucks)
Rockers (chairs)
Singletrees
Stirrups
Trunks
Trunk slats
Wheelbarrows

RED GUM

Bottom boards (piano)
Boxboards (dump carts)
Boxes
Box shooks
Bottoms (vehicles)
Cabinet backs
Cabinets
Car construction (gear cases)
Car construction (finish)
Caskets
Carvings
Chairs
Cigar boxes
Corn graders
Crating
Cultivator handles
Dining tables
Drawer bottoms
Ensilage cutter tables
Farm implements
Fixtures (bank)
Fixtures (soda fountain)
Fixtures (store and office)
Furniture (church)
Furniture (exposed)
Furniture (interior work)
Guitar bodies
Handles
Hay-baler parts
Interior finish
Kitchen cabinets
Kitchen cabinets (backing)
Manure spreaders
Neck yokes (cultivator)
Pianos
Piano benches
Panels (veneered)
Picture mouldings
Planing mill work
Organs
Seats (water closets)
Self feeders (threshing machines)
Sewing machines parts
Singletrees (cultivators)
Tables
Trunk bodies
Trunk trays
Tanks (water closets)
Thresher parts
Turnings
Vehicle bodies
Wardrobes (exterior work)
Wardrobes (interior work)
Wheelbarrows
Window screens

RED OAK

Agricultural implements (parts)
Barber furniture
Barrow boxes
Baskets
Beams (pl[illegible])
Beds
Bentwood
Billiard tables
Bob sleds
Bottoms (wagon)
Boxes
Bucket staves

Buggy bows
Cabinets
Cabin parts
Car construction
Cars (mine)
Car repairing
Casing (building)
Caskets
Chair frames (upholstered furniture)
Chairs
Chairs (office)
Chair stock
China closets
Church pews
Clothes props
Corn shellers
Cornices
Crating
Cultivator handles
Decking
Disc harrow parts
Doors
Double doors (farm implements)
Drags (farm implements)
Dresseirs
Dressang tables
Elevtor flooring
Eveners (farm implements)
File cases
Fixtures (bank)
Fixtures (barber shop)
Fixtures (display window)
Fixtures (soda fountain)
Flooring (hardwood)
Flag staffs
Folding beds
Folding machines
Frames (couches)
Frames (davenport)
Frames (light and heavy vehicle bodies)
Frames (upholstered parlor furniture)
Furniture
Hallracks
Hay-loader parts
Interior finish
Kitchen cabinets (exterior)
Lodge furniture
Mantels
Manure spreaders
Mission furniture
Moulding (stairwork)
Organ (pipe) cases
Organ actions
Organs
Parquetry flooring
Piano bencnes
Piano cases
Piano parts
Piano stools
Piano tops
Picture moulding
Planing mill products
Platforms (stairwork)
Plow beams
Plow handles
Plow parts (gang)
Plow rounds
Pokes (animal)
Porch work
Refrigerators
Rocker frames (upholstered furniture)
Sash
Sheathing
Showcases
Sideboards (built in)
Sideboards (exterior work)
Sling crossbars
Stirrups
Sulky plow parts
Table legs
Tables (extension)
Tables (library)
Tables (writing)
Tabourets
Tanks (water closets)
Trucks
Toys
Veneer
Wainscoting
Washstands

RED SPRUCE

Car construction
Piano boxing
Piano parts

NORWAY PINE

Agricultural implements (hullers)
Building material
Car construction
Ceiling
Derricks
Doors
Framing
Frames (carriage)
Floorings
Handrails
Ladders (extension)
Ladders (fire department)
Machinery construction
Pedal pipes
Patterns
Siding (railway cattle cars)
Threshers

REDWOOD

Columns (porch)
Cornice
Frames
Framework (organs)
Incubators
Porch work
Siding
Tanks

ROSEWOOD

Furniture (exterior)
Musical instruments

SHORTLEAF YELLOW PINE

Agricultural implements (hullers)
Agricultural implement parts
Barges
Baseboards
Beef hoist beams
Boats
Bottoms (heavy vehicle bodies)
Bottoms (light vehicle bodies)
Blinds
Boxes
Boxes (cern planters)
Boxes (fed mills)
Box shooks
Casing
Car construction
Car repairing
Ceiling
Columns (porch)
Cornices
Corn husker parts
Corn sheller parts
Corn shredder parts
Corn planter parts
Crating
Door frames
Doors
Fixtures (bank)
Fixtures (store and office)
Flasks
Flooring
Flooring (scale platform)
Furniture
Interior finish (building)
Ladders (step)
Millwork
Mouldings
Newels (stairwork)
Pump boxes
Planing mill products
Sash
Sheathing
Showcases
Sills
Stairwork
Sweeps (feed mills)
Tanks (water closets)
Threshing machines
Vehicles
Wagon boxes

SITKA SPRUCE

Boat floors
Braces
Canoes
Crating
Door frames
Doors
Fixtures
Frame work
Furniture
Grand pianos
Keyboards (pianos)
Organ parts
Organ pipes
Refrigerators
Sash
Store fronts
Window frames

SOFT MAPLE (SILVER MAPLE)

Action parts (pianos)
Backing (veneer)
Boxes
Cabinets (kitchen)
Candy pails
Crating
Egg cases
Fixtures
Flasks
Furniture
Kitchen chairs
Packages (fruit and vegetable)
Patterns
Pulley frames
Planing mill products
Seats (water closet)
Tables (kitchen)
Tanks (water closet)
Toys

SPANISH CEDAR

Boats
Cigar boxes

SUGAR MAPLE (HARD MAPLE)

Agricultural implements (hullers)
Agricultural implement parts
Automobiles
Backs (washboard)
Bearing boxes (farm implements)
Bobsleds
Bolsters (wagon)
Bottoms (delivery wagons and trucks)
Bottoms (heavy vehicle bodies)
Box boards (wagons)
Boxes
Brush rolls
Brush blocks
Cabinets (kitchen)
Carvings
Car construction
Car repairing
Chairs
Chairs (folding)
Chairs (opera)
Chair legs
Chair parts
Cider mills
Controller boards (motor cars)
Church furniture
Corn binder parts
Corn grinder parts
Corn husker parts
Corn sheller parts
Crating
Drags (farm implements)
Dredge parts
Electric car (matting)
Electric construction
Elevator flights
Elevator guides
Elevator platforms
Ensilage cutter frames
Eveners (farm implements)
Feed cutters
Flasks
Flooring (hard wood)
Flooring (heavy trucks)
Floors (platform trucks)
Floor mats
Fodder shredder parts
Frames (grindstone)
Frames (light vehicle)
Frames (spring beds)
Framing (sawmill)
Furniture
Go-carts
Grain separators (agricultural)
Guns
Games of chance
Hand cars
Hand corn planters
Handles
Handles (broom)
Handles (duster)
Handles (lawn mower)
Hangers (garment)
Hayloader parts
Hay rakes
Hoops (embroidery)
Ladders
Lasts
Looms
Machinery construction
Match boards
Motor car parts (railway)
Neck yokes (cultivator)
Organ cases (reed)
Organ cases (pipe)
Organ keys
Planing mill products
Piano actions
Piano benches
Piano cases (finish)
Piano cases (unexposed)
Piano parts
Piano stools
Picture molding
Poles (farm implements)
Press racks
Posts (seat)
Pulleys
Pulleys (hay)
Ribs (washing machines)
Rims (trucks)
Rollers
Self-feeders (threshing machines)
Sheathing
Sheaves
Sill sides (washboards)
Singletrees (cultivator)
Sleds (farm implements)
Stanchions (cow ties)
Tables
Threshers
Trestles
Trucks (warehouse)
Turnings
Vehicle bodies
Vehicle gears
Wardrobes (extension)
Washing machines
Wheelbarrows

SUGAR PINE

Doors
Millwork
Organ pipes
Patterns
Sash
Threshing machine parts

BIRCH

Automobiles
Balusters
Baby perambulators
Baseboards
Billiard tables
Boats
Bookcases (interior)
Boxes
Brush blocks
Buffets (bar fixtures)
Bureaus (exterior)
Cabinet work
Car construction
Car repairing
Cases (medicine)
Caskets
Carvings (coffins)
Crating
Doors
Dressers
Dressing tables
Farm implement parts
Farm machinery parts
Fixtures (bank)
Fixtures (bar)
Fixtures (laboratory)
Fixtures (soda fountain)
Fixtures (store and office)
Flooring
Furniture
Frames (couches)
Frames (davenports)
Furniture (church)
Handles
Hall racks
Headlining
Hoops (embroidery)
Interior finish
Mantels
Mill work
Moulding
Novelties
Organ cases (part)
Parlor rockers
Pedestals
Piano benches
Piano chairs
Pianos
Picture mouldings
Planing mill products
Pulley stiles
Refrigerators
Sample cases
Sash (window)
Seats (water closets)
Sewing machines
Show cases
Sideboards (exterior)
Sofa frames (parlor furniture)
Stair work
Tables
Tanks (water closets)
Trunks
Turnings
Vehicles
Wainscoting

Fig. 27. Tapping hard maples for making sugar.

Fig. 28. An old time evaporizer for making maple sugar still in use in Ohio.

SYCAMORE

Boxes
Boxes (cigar)
Brush blocks
Cabinet work
Crating
Doors
Handles
Handles (broom)
Interior finish
Planing mill products
Sides (vehicle)
Sash
Threshing machinery
Piano backs
Tobacco boxes

TAMARACK

Crating
Car construction

COTTON GUM

Boxes
Cigar boxes
Crating
Furniture

WALNUT (BLACK)

Altar (church)
Barber chairs
Car repairing
Caskets
Chairs (ecclesiastical)
Doors
Fixtures (store and office)
Furniture (church)
Furniture
Gun butts
Gun forearms
Lodge furniture
Machinery construction
Mill work
Organ actions
Organ (reed) cases
Organs (interior work)
Panels (veneered)
Patterns
Piano benches
Piano cases
Piano veneer
Piano parts
Picture mouldings
Sash
Showcases
Tables (dining)
Tables (parlor)
Wind shields (automobile)

WESTERN WHITE PINE

Columns (porch)
Door frames
Dressers
Millwork
Tanks

WHITE ASH

Automobiles (rim boards)
Bars (vehicle)
Baseball bats
Bent panels (light vehicle bodies)
Beam (cultivators)
Baby perambulators
Bobsleds
Bows
Butter tubs (heading)
Boxes
Butter tubs (staves)
Cabinet work
Car construction (framing)
Car repairing
Chairs
Church pews
Churns
Churn lids
Corn planters
Cylinders (cider mill)
Flooring
Frames (automobile bodies)
Frames (buggy and carriage bodies)
Frames (light vehicle seats)
Frames (wagon boxes)
Furniture (interior)
Gears (coach)
Handles
Handles (edge tool)
Hames (wood)
Harrows
Hoe handles
Hose truck bodies
Hounds (vehicles)
Interior finish (house)
Machinery (construction)
Kitchen cabinets
Mouldings
Piano parts
Planing mill products
Plow beams
Pokes (animal)
Poles (heavy vehicles)
Posts (vehicles)
Rails
Rake heads
Rake (garden) handles
Rims (vehicle)
Refrigerators
Rosts
Sash
Shovel handles
Staves
Tools
Vehicle bodies and parts
Yokes
Wagon parts
Well-digging machines

WHITE ELM

Automobile parts
Boxes
Cabinets (kitchen)
Car repairing
Chair frames (upholstered furniture)
Chairs (kitchen)
Chair stock
Crating
Electric cars
Elevators
Flasks
Folding machines
Furniture
Interior finish
Machinery construction
Piano benches
Piano backs
Pillars
Press racks
Refrigerators
Rockers
Toys
Trunk slats
Trunk boxes
Wheelbarrows

WHITE OAK

Agricultural implements (hullers)
Agricultural implements (parts)
Ax handles
Backs (brushes)
Barber chairs
Barber furniture
Bar fixtures
Barrow boxes
Barges
Baskets
Beams (plow)
Beds
Bentwood
Billiard (tables)
Boats
Boat parts (row)
Bob-sleds
Bolsters (heavy vehicles)
Booms
Bottoms (baggage trucks)
Bottoms (delivery wagon)
Brake beams (heavy articles)
Bucket staves
Buffers
Cabinet finish
Cabinets (kitchen)
Cabinet work
Cabins (boats)
Car repairing
Cars (mine)
Car construction (framing)
Car construction (decking)
Carvings
Case recorders (physicians)
Cash registers
Casing
Caskets
Casks
Ceiling
Chairs (opera)
Chair stock
Chiffoniers
Churns
Church pews
Circus seats
Cleats (wagon boxes)
Coffins
Columns (porch)

Cooperage
Corn binders
Corn grinders
Corn shellers
Counters (bar)
Counters (store)
Crating
Cultivator handles
Desks (house)
Desks (office)
Disc drill parts
Disc harrow parts
Doors
Doubletrees (farm implements)
Doubletrees (vehicle)
Drags (farm implements)
Dredges
Dressers
Dressing tables
Drill parts (farm implements)
Edge-tool handles
Elevator cages
Ensilage cutters
Eveners (farm implements)
Feed cutters
Felloes
File cases
Finish (inside)
Fixtures (bar)
Fixtures (bank)
Fixtures (barbershop)
Fixtures (display window)
Fixtures (laboratory)
Fixtures (soda fountain)
Fixtures (store and office)
Flooring (hardwood)
Floors (tipple)
Framing
Frames (auto)
Frames (light vehicle bodies)
Frames (machinery)
Frames (window)
Furniture
Furniture (church)
Gear woods (light vehicle)
Guitar bodies
Hammer handles
Handles
Handles (broom)
Harrow bars
Harrows
Hay baler parts
Hay rake parts
Hounds
Hubs
Hubs (heavy vehicle wheel)
Interior finish
Kitchen cabinets (exterior)
Kitchen cupboards
Kitchen safes
Lawn swings
Ladders
Lodge furniture
Machinery construction
Mantels
Manure spreaders
Mill work
Mine car bodies
Mission furniture
Moulding (house trimming)
Music cabinets
Neck yokes
Organ bellows
Organ cases
Organ pipes
Panels (veneered)
Parlor cabinets (exterior)
Parlor rockers
Piano benches
Piano cases
Piano chairs
Piano finish
Piano parts
Piano players (exterior)
Piano stools
Piano tops
Picture mouldings
Planing mill products
Platforms
Plate racks
Plow beams
Plow handles
Plow rounds
Plow parts (gang)
Plows
Pokes (animal)
Poles (vehicle)
Poles (agricultural implements)
Pool tables
Posts (stairwork)
Posts (wagon)
Press parts
Pump patterns
Registers (cold air)
Reels (electric light wire)
Refrigerators
Rims (heavy vehicle wheels)
Rocker frames (upholstered furniture)
Sash
Seats (water closet)
Sections (wheel-scrapers)
Seeder parts (farm implements)
Serving tables
Settees
Sideboards (exterior)
Sills
Singletrees (cultivators)
Singletrees (vehicles)
Skids
Sling cross bars
Spokes (heavy vehicles)
Stacker parts (farm machinery)
Stairwork
Staves (water tanks)
Stirrups
Sulky plow parts
Sweeps (farm machinery)
Tables (extension)
Tables (library)
Tables (parlor)
Tables (typewriter)
Tables (writing)
Tanks (water closets)
Threshing machines
Tongues (wheel scrapers)
Trucks
Truck bodies
Trunks
Turnings
Vehicle bodies
Veneer
Wagon boxes
Wagon reaches
Wagon tongues
Wall cases
Wardrobes (exterior)
Washing machines
Weather boarding
Well-digging machinery
Wheelbarrows
Window screens

WHITE PINE

Agricultural machinery
Actions (piano, organ)
Beehives
Blinds
Bookcases (inside)
Bottoms (wagon boxes)
Boxes
Box shooks
Cabin parts (boats)
Car construction
Car construction (patterns)
Car repairing
Carvings
Caskets
Casting patterns
Ceiling
Coffins
Cornices
Crating
Door frames
Doors
Flooring
Fixtures
Foundry flasks
Furniture
Keys (piano)
Incubators
Machinery construction
Matches
Mess tables
Mill work
Organ pipes
Packing tubs
Patterns (cars)
Patterns (machine parts)
Patterns
Planking (boats)
Planing mill work
Porch work
Pumps
Rolling globes
Sash
Sash (storm)
Screen doors
Shelving
Shipping cases
Siding (barn)
Siding
Signboards
Silos
Storm sash
Tanks (water closet)
Tank bottoms
Trunks
Templets
Tobacco boxes
Vehicles
Wainscoting
Window frames
Window sash
Window screens

WHITE SPRUCE

Sounding boards

WILLOW

Artificial limbs

YELLOW POPLAR

Actions (piano players)
Agricultural implements (parts)
Automobiles
Backs (washboards)
Barber chairs
Baseboards
Baskets (fruit)
Bevel sidings
Blinds
Bookcases
Boxboards (heavy vehicles)
Boxes (veneer)
Box shooks
Brush blocks
Carvings
Cabinets
Car repairing
Car construction
Cart beds
Cases (medicine)
Casing
Caskets
Ceiling
Church furniture
China closets (inside)
Cider mills
Cigar boxes
Churns
Coffins
Cornice
Corn shellers
Crates (fruit and vegetable
Crating
Desks (inside)
Drawer bottoms (furniture)
Doors
Elevators
Elevators (corn)
Exterior finish
Facia
Evaporator pan sides
Feedcutter tables
Filler pieces
Fixtures (bank)
Fixtures (bar)
Fixtures (display windows)
Fixtures (laboratory)
Fixtures (store and office)
Flooring
Frames (windows)
Furniture
Handles
Hoppers
Interior finish
Ironing-boards
Ladders
Laths
Machinery construction
Moulding (piano cases)
Mill work
Organ chests
Organ parts (interior)
Organ pipes
Panels (automobile bodies)
Panels (vehicle bodies)
Panels (veneered)
Piano finish
Piano parts
Picture mouldings
Planing mill products
Pipe organs (interior parts)
Pool tables
Pumps
Refrigerators
Roofing
Sash
Screen doors
Seats (automobile)
Seats (buggy)
Seats (carriages)
Seats (water closets)
Sewing machine parts
Sideboards (built in)
Sidings
Sidings (grain grinders)
Sidings (Ry. refrigerator cars)
Sidings (washboards)
Sidings (wagon beds)
Signboards
Sheathing
Sled cultivators
Swing seats
Table (cafe)
Tables (dining)
Tanks (water closet)
Trunks
Turnings
Vehicle bodies
Veneer cores (organ cases)
Veneer cores (piano)
Washing machines
Wardrobes (inside)
Window screens
Wood pumps

DIRECTORY OF MANUFACTURERS

AGRICULTURAL IMPLEMENTS

NAME	TOWN
Akron Cultivator Co	Akron
Whitman & Barnes Mfg. Co	Akron
Hoover Mfg. Co	Avery
Ohio Cultivator Co	Bellaire
Thornburg Mfg. Co	Bowling Green
Bryan Plow Co	Bryan
Buckeye Handle Wooks	Canfield
V. L. Ney Co	Canton
The Ney Mfg. Co	Canton
Bucher & Gibbs Plow Co	Canton
Stark Lumber Co	Canton
Joseph Dick	Canton
The Deerlick Oil Stove Co	Chagrin Falls
Empire Plow Co	Cleveland
New Idea Spreader Co	Cold Water
InternationalMfg. Co	Crestline
Ohio Rake Co	Dayton
Sieberling & Miller Co	Doylestown
Lehr Agricultural Co	Fremont
Hughes & Smythe	Galena
Long & Allstatter Co	Hamilton
Panning Brothers	Hamler
Campbell Corn Drill Co	Harrison
C. S. Bell Co	Hillsboro
Eagle Machine Co	Lancaster
Hocking Valley Mfg.	Lancaster
Brown-Manley Plow Co	Malta
Aultman-Taylor Machinery Co	Mansfield
Roderick Lean Mfg. Co	Mansfield
Huber Mfg. Co	Marion
Ohio Tractor Mfg. Co	Marion
W. R. Harrison & Co	Massillon
Russell & Co	Massillon
Blair Mfg. Co	Newark
The Star Mfg. Co	New Lexington
N. L. Shoup	New Springfield
The Silver Mfg. Co	Salem
American Steel Scraper Co	Sidney
Sidney Steel Scraper Co	Sidney
The Phillip Smith Mfg. Co	Sidney
Slusser & McLean Scraper Co	Sidney
Buckeye Div. American Seeding Mch. Co.	Springfield
International Harvester Co	Springfield
Mast Foos & Co	Springfield
The E. W. Ross Co	Springfield
Superior Drill Co	Springfield
American Seeding Mch. Co	Springfield
Thomas Mfg. Co	Springfield
The A. D. Baker Co	Swanton
The Toledo Plow Co	Toledo
Brown Mfg Co	Zanesville

BOAT AND SHIP BUILDING

Riverside Mill Co	Antiquity
Barrett Mill & Lumber Co	Cincinnati
American Ship Bldg. Co	Cleveland
John E. Lyon	Higginsport
J. M. Hammitt	Marietta
Acme Folding Boat Co	Miamisburg
S. L. Malin & Son	Painsville
Mathews Boat Co	Port Clinton
The W. H. Mullins Co	Salem
Davis Boat Works	Sandusky
Lake Erie Dry Dock & Mill Co	Sandusky
Stryker Boat Oar & Lumber Co	Stryker
West Unity Mfg. Co	West Unity

BOXES AND CRATES

American Sewer Pipe Co	Akron
Diamond Rubber Co.*	Akron
Firestone Rubber Co.*	Akron
Goehring Mfg. Co	Akron
Goodrich Rubber Co.*	Akron
Hillgreen Lane Co.*	Alliance
McCaskey Register Co..*	Alliance
Atwater Basket & Veneering Co	Atwater
The B. L. Marble Chair Co.*	Bedford
Taylor Chair Co.*	Bedford
Buckeye Carriage Body Co.*	Bellefontaine
Cleveland Stone Co	Berea
Berlin Fruit Box Co	Berlin Heights
Scott & Ewing Co.*	Bluffton
Thornburg Mfg. Co.*	Bowling Green
Bryan Show Case Co.*	Bryan
The Richland Handle Works*	Butler
Adams Carriage Co.*	Canal Dover
American Sheet Metal Co.*	Canal Dover
Canfield Mfg. Co.*	Canfield
Berger Mfg. Co	Canton
Canton Box & Crate Co	Canton
Canton Buggy Co.*	Canton
The John Danner Mfg. Co.*	Canton
Joseph Dick*	Canton
Gibbs Mfg. Co	Canton
Havard Co	Canton
Knight Mfg. Co	Canton
F. E. Kohler Co	Canton
The Ney Mfg. Co	Canton
Ames Bending Co*	Celina
Wm. Cron Sons Co	Celina
Mersman Bros. Brandts Co.*	Celina
The Deerlick Oil Stone Co.*	Chagrin Falls
Aman & Sandman	Cincinnati
The Acorn Buggy Co.*	Cincinnati
American Carriage Co	Cincinnati
American Laundry Machine Mfg. Co	Cincinnati
Anchor Box Co	Cincinnati
The A. Armstrong Co	Cincinnati
John H. Bade	Cincinnati
P. T. Baker & Son	Cincinnati
Beck & Mueller*	Cincinnati
Eugene Berninghause Co	Cincinnati
Betts-Street Furniture Co	Cincinnati
Chas. Bolt Co	Cincinnati
Brumwell Brush & Wire Goods Co	Cincinnati
Case Crane Co	Cincinnati
Allis Chalmers Co.*	Cincinnati
Champion Tool Works*	Cincinnati
Eincinnati Wire Bound Box Co	Cincinnati
C. A. Conkling Box Co	Cincinnati
Columbia Show Case Co.*	Cincinnati
E. Crane & Co	Cincinnati
Crooks Pattern Works*	Cincinnati
Dana Mfg. Co	Cincinnati
J. F. Deitz Co	Cincinnati
J. Dornette & Bro. Co*	Cincinnati
John Douglass*	Cincinnati
Enger Motor Car Co.*	Cincinnati
Ficks Reed Co	Cincinnati
Globe Wernicke Co.*	Cincinnati
Hickory Carriage Co	Cincinnati
Fred Kenker & Sons	Cincinnati
Lion Buggy Co	Cincinnati
Lobnitz Co	Cincinnati
Louis Lipp Co	Cincinnati
A. Lukenheimer & Co.*	Cincinnati
McWilliams & Schulte	Cincinnati
Miller, DuBrul & Peters Mfg. Co.*	Cincinnati
National Billiard Mfg. Co.*	Cincinnati
Ohio Pattern Works*	Cincinnati
Queen City Box Co	Cincinnati
Ratterman & Luth	Cincinnati
A. Renesch & Co	Cincinnati
Reuhl Moulding Mfg. Co.*	Cincinnati
Sagers & Scoville	Cincinnati
Schirmer Furniture Co	Cincinnati
Sechler & Co	Cincinnati
Sextro Mfg. Co	Cincinnati
Steinman & Meyer Furniture Co.*	Cincinnati
The S. F. Street Mfg. Co.*	Cincinnati
I. Stroble Co.*	Cincinnati
Superior Box Co	Cincinnati
Frank Unnewehr Co	Cincinnati
Ward-Brook Sash & Door Co.*	Cincinnati

NAME	TOWN
Wildberg Lumber Co.	Cincinnati
Withrow Mfg. Co	Cincinnati
Acme Box & Lumber Co	Cleveland
American Box Co	Cleveland
Buckeye Stereopticon Co	Cleveland
Buckeye Box Co.	Cleveland
Cleveland Box Co	Cleveland
James Dunn Co	Cleveland
Forest City Box Co	Cleveland
The Gebs Moulding & Mfg. Co	Cleveland
J. N. Hahn Co	Cleveland
Theo. Kundts*	Cleveland
National Fixture Co.*	Cleveland
D. T. Owen Co.*	Cleveland
Peerless Motor Car Co	Cleveland
Fred Pollard	Cleveland
Saginaw Bay Box Co	Cleveland
Smeed Box Co	Cleveland
Standard Sewing Machine Co.*	Cleveland
Star Box Co	Cleveland
C. E. Taft*	Cleveland
The Zimmerman Co	Cleveland
Buckeye Steel Casting Co.*	Columbus
Case Crane Co	Columbus
The Columbus Buggy Co	Columbus
The Henry Holtzman & Sons*	Columbus
The Jeffrey Mfg. Co	Columbus
Ohio Carriage Mfg. Co	Columbus
Peters Buggy Co	Columbus
R. A. Rood	Columbus
Scioto Box Co	Columbus
The Seagrove Co.	Columbus
Wm. Sebold	Columbus
Sun Mfg. Co.*	Columbus
Wildermuth Bending Co.*	Columbus
Columbiana Mfg. Co.	Cclumbiana
H. O. Beech Co	Coshocton
Coshocton Glass Co	Coshocton
Holcher Bros. Buggy Co.*	Crestline
C. E. Cottrell	Curtice
Falls Clutch & Machinery Co	Cuyahoga Falls
Walsh Milling Co	Cuyahoga Falls
Crawford, McGregor & Canby Co	Dayton
Buckhardt Furniture Co.*	Dayton
Davis Sewing Machine Co.*	Dayton
Gondert & Lienesch	Dayton
L. W. Keyer	Dayton
Mutual Mfg. Co	Dayton
National Cash Register Co.*	Dayton
National Sign Co.*	Dayton
Ohio Rake Co	Dayton
M. Ohmer's Sons Co	Dayton
The Shieble Toy & Novelty Co	Dayton
P. T. Coffield & Son*	Dayton
Defiance Box Co	Defiance
Sun Ray Stove Co.*	Delaware
Oak Mfg. Co	Edgerton
J. G. Haury Bending Works*	Erkhart
Bryant Basket Co	Findlay
Findlay Carriage Co	Findlay
Cunningham Mfg. Co.*	Fostoria
Peabody Carriage Co	Fostoria
Fremont Furniture Co.*	Fremont
Gallia Furniture Co.*	Gallipolis
Ohio Valley Furniture Co	Gallipolis
The Potter Mfg. Co.*	Geneva
Glenford Mfg. Co	Glenford
Hoo Hoo Kitchen Cabinet Co.*	Greenfield
Gem Incubator Co.*	Greenville
The Anderson Tool Co.*	Hamilton
The H. P. Deuscher Co.*	Hamilton
The Long & Allstatter Co	Hamilton
Sanitary Mfg. Co.*	Hamilton
Campbell Corn Drill Co.*	Harrison
The C. S. Bell Co.*	Hillsboro
L. B. Miller	Hillsboro
Jackson Mfg. Co	Jackson
The Lima Locomotive and Machine Co	Lima
Philip Carey Mfg. Co*	Lockland
Snider Mfg. Co.*	Logan
Baxter Stove Co.*	Mansfield
John A. Halter	Mansfield
Humphrey Co.*	Mansfield
Roderick Lean Mfg. Co.*	Mansfield
The Becker Mfg. Co.*	Marietta
Marietta Fruit Package Co	Marietta
Marietta Mantel Co*	Marietta
Stevens Organ Works*	Marietta
Marion Steam Shovel Co.*	Marion
McMurry Sulky Co.*	Marion
LaBelle Box Co	Martin's Ferry
The Martin's Ferry Box & Barrel Co.,	Martin's Ferry
Davis Chair Co.*	Marysville
The A. I. Root Co	Medina
Enterprise Carriage Mfg. Co	Miamisburg
Middlefield Basket Co	Middlefield
Middletown Buggy Co	Middletown
Philps Sheet & Tin Plate Co	Steubenville
C. T. Daniels	Minerva
W. C. Heller Co.*	Montpelier
Hydraulic Press Mfg. Co	Mt. Gilead
Barnard Bros	Mt. Vernon
The Heller-Aller Co.*	Napoleon
Newark Ohio Furniture Co.*	Newark
The Ward Stilson Co	New London
Enterprise Planing Mill Co	New Waterford
The Koch Bros. Co.*	New Waterford
Deforest Sheet & Tinplate Co.*	Niles
A. B. Chase Co.*	Norwark
Gordon Lumber, Basket & Mfg. Co	Oakharbor
S. L. Malin & Son*	Painesville
The Harrison Basket Co	Painesville
F. A. Witzler	Perrysburg
The King Mfg. Co.*	Piqua
The Piqua Furniture Co.*	Piqua
Sprague Smith Co.*	Piqua
Port Clinton Lumber & Coal Co	Port Clinton
Portsmouth Steel Co.*	Portsmouth
Buckeye Chair Co.*	Ravenna
Oscar Chase & Son	Rutland
Crane & McMahon*	St. Mary's
Clinton Mfg. Co.*	Sabina
American Case & Register Co.*	Salem
Buckeye Engine Co	Salem
The Deming Co	Salem
The Silver Mfg. Co.*	Salem
The W. H. Mullins Co	Salem
American Crayon Co	Sandusky
Germania Basket Co	Sandusky
One Minute Washer Co.*	Sandusky
The Sandusky Lumber & Box Co	Sandusky
The Sebring Cooperage Co	Sebring
Alderfer Crate Co	Sharon Center
The Bimel Buggy Co.*	Sidney
Sidney Mfg. Co.*	Sidney
Sidney Tool Co	Sidney
Wagner Mfg. Co.*	Sidney
The Henry Prasse Co	South Euclid
The Hardman-Potters Crate & Box Co.,	Zanesville
Buckeye Division (American Seeding Machine Co.)*	Springfield
American Seeding Machine Co.*	Springfield
The Bauer Bros. Co.*	Springfield
International Harvester Co.*	Springfield
The E. W. Ross Co.*	Springfield
Superior Drill Co	Springfield
Thomas Mfg. Co	Springfield
Ford Glass Co.*	Toledo
Gendron Wheel Co.*	Toledo
Milburn Wagon Co.*	Toledo
Phoenix Box Factory	Toledo
Schauss Parlor Frame Co	Toledo
J. M. Skinner Bending Co.*	Toledo
The Toledo Screen Co.*	Toledo
Geo. Wilson & Sons Co	Toledo
The Yesbera Mfg. Co.*	Toledo
The Troy Carriage Sunshade Co.*	Troy
The Star Storm Front Co.*	Troy
The Central Ohio Buggy Co.*	Upper Sandusky
The Advance Glass Co.*	Utica
The Licking Window Glass Co.*	Utica
The Utica Glass Co.*	Utica
The New Wapakoneta Wheel Co.*	Wapakoneta
The Western Reserve Furniture Co.*	Warren
Geo. W. Hoffman	Wellington
Rippe Mfg. Co	West Lafayette
Carnegie Steel Company*	Youngstown
Gibson Mattix Mfg. Co	Youngstown

NAME	TOWN
W. H. Taylor	Zanesville

BRUSHES

The Whitman & Barnes Mfg. Co.	Akron
Bromwell Brush & Wire Goods Co.	Cincinnati
The Mercer Brush Co	Cincinnati
Geo. Keyer Co	Cincinnati
Osborn Mfg. Co	Cleveland
The Ames Bonner Co.	Toledo

BUNGS AND FAUCETS

The American Bung Mfg. Co	Cincinnati
National Bung Mfg. Co	Cincinnati
Queen City Bung Mfg. Co	Cincinnati
United States Bung Mfg. Co	Cincinnati

CAR CONSTRUCTION

Caldwell Mining Car Mfg. Co	Caldwell
The Fulton Pit Car Co	Canal Fulton
Cincinnati Car Co	Cincinnati
Cleveland, Cincinnati, Chicago & St. Louis Ry	Cincinnati
The Cincinnati Traction Co	Cincinnati
Interurban Ry. & Terminal Co	Cincinnati
Atlas Car Mfg. Co	Cleveland
Cleveland Railway Co	Cleveland
G. C. Kuhlman Car Co	Collinwood
Lake Shore & Michigan Southern Ry	Collinwood
Ralston Steel Car Co	Columbus
Hocking Valley Ry	Columbus
The Barney Smith Car Co	Dayton
Tri-State Railway & Electric Co.,	East Liverpool
Detroit, Toledo & Ironton Ry	Jackson
Lima Locomotive & Machine Co	Lima
Mineral Ridge Mfg Co	Mineral Ridge
Cleveland Akron & Columbus Ry	Mt. Vernon
Star Mfg. Co	New Lexington
The Jewett Car Co	Newark
Erie R. R.	New York. N. Y.
The Niles Car & Mfg. Co	Niles
Pennsylvania Line	Pittsburg, Pa.
Wabash R. R.	St. Louis, Mo.
Illinois Car Co	Urbana
Acme Handle Co	Warren
The Cleveland, Painesville & Eastern R. R. Co	Willoughby
Youngstown Car Mfg. Co	Youngstown

CASKETS AND COFFINS

Belmont Casket Mfg. Co	Bellaire
Scioto Valley Casket Co. & Bonner Bros.	Chillicothe
Cincinnati Coffin Co	Cincinnati
Crane & Breed Mfg. Co	Cincinnati
Cleveland Burial Case Co	Cleveland
The Columbus Coffin Co	Columbus
Ohio Casket Co	Columbus
Findlay Casket Co	Findlay
B. F. Briggs	Pomeroy
The Springfield Coffin & Casket Co	Springfield
Stoll Casket Co	Upper Sandusky
The Muskingum Coffin Co	Zanesville

CHAIRS

Baltic Bending Co	Baltic
The B. L. Marble Chair Co	Bedford
Taylor Chair Co	Bedford
Hardesty Mfg. Co	Canal Dover
Standard Furniture Co	Cincinnati
Cincinnati Chair Co	Cincinnati
B. Klinker Co	Cincinnati
H. Closterman	Cincinnati
Ficks, Reed Co	Cincinnati
Fred S. Lubke Sons	Cincinnati
The Henry Holtzman & Sons Co	Columbus
Marble and Shattuck Chair Co	Cleveland
Delaware Chair Co	Delaware
A. J. Peterman	Fredericksburg
The Gallipolis Chair Co	Gallipolis
Globe Chair Co	Hillsboro
Marietta Chair Co	Marietta
Davis Chair Co	Marysville
The Buckeye Chair Co	Ravenna
Shilling & Son	Tiro
Williams & Co	Toledo
T. J. Collins & Co	Toledo
Glendron Wheel Co	Toledo
Waldcutter & Kahlenburg	Toledo
Warren Mfg. Co	Warren
The Washington Mfg. Co	Washington C. H.
J. H. White	Williamsburg
Williamsburg Furniture Co	Williamsburg
Wayne Lumber & Mfg. Co	Wooster

CIGAR BOXES

E. J. Hutchison	Barnesville
Aman and Sandmann	Cincinnati
Bastian Cigar Box Co	Cincinnati
The Samuel W. Frost Co	Cincinnati
R. H. Brenner & Co	Cincinnati
Geese Cigar Box Co	Cincinnati
Queen City Box Co	Cincinnati
Frank Unnewehr Co	Cincinnati
L. Richensburgs Sons	Cleveland
Scioto Box Co	Columbus
L. W. Keyer	Dayton
H. B. Tenzer Lumber Co	Defiance
W. H. Potter	Delaware
Levi K. Basore	Farmersville
The Benner Lumber Co	Greenville
John Fluispach Bros	Germantown
Globe Cigar Box Co	Lima
Superior Cigar Box Mfg. Co	Minster
Standard Box Co	Sandusky
Horace P. Keyes	Waynesville

DAIRYMAN'S, POULTERERS' AND APIARISTS' SUPPLIES

The Cardington Cabinet Co	Cardington
The Dana Mfg. Co	Cincinnati
Defiance Box Co	Defiance
McKenzie Lumber Co	Delaware
The Gem Incubator Co	Greenville
B. F. Hook	Holmesville
H. J. Ryan	Lagrange
Huber Mfg. Co	Marion
The A. I. Root Co	Medina
The Beell Handle Co	New Bremen
Fuller & Kirkton	New London
A. Cook & Co	New Knoxville
G. W. Stafford & Co	Novelty
The Easy Washing Machine Co	St. Marys
The Buckeye Churn Co	Sidney
The Buckeye Incubator Co	Springfield
American Woodenware Mfg Co	Toledo
The M. Brown Co	Wapakoneta
The Standard Churn Co	Wapakoneta

ELEVATORS

James Curran Elevator Co	Cincinnati
H. J. Reedy Elevator Co	Cincinnati
Warner Elevator Mfg. Co	Cincinnati
Sidney Elevator Co	Sidney

FIXTURES

Ada Coal & Lumber Co	Ada
Star Planing Mill Co	Akron
McCaskey Register Co	Alliance
Ashley Lodge & Church Furniture Co	Ashley
The Hardwood Finish Co	Athens
Harvard Co	Canton
The John Danner Mfg. Co	Canton
Chas. H. Lind	Canton
Scioto Valley Casket Co. & Bonner Bros.	Chillicothe
Cincinnati Butchers Supply Co	Cincinnati
P. T. Baker & Son	Cincinnati
Allis Chalmers Co	Cincinnati
Beck & Mueller	Cincinnati
The Amercian Billiard Table & Saloon Fixture Co	Cincinnati

NAME	TOWN
Huss Bros. Mfg. Co.	Cincinnati
The Thos. Kelsall Co.	Cincinnati
Hyde Park Lbr. Co.	Cincinnati
Geo. Keyer Co.	Cincinnati
Kloak Bros. & Co.	Cincinnati
The H. Kruse Show Case Co.	Cincinnati
Columbia Show Case Co.	Cincinnati
Maley Bros. & Co.	Cincinnati
M. Marcus Bldg. Co.	Cincinnati
The C. Schmit Co.	Cincinnati
Oscar Onken Co.	Cincinnati
M. Ottman & Co.	Cincinnati
Schmitt Show Case Co.	Cincinnati
J. F. Deets & Co.	Cincinnati
The J. Dornette & Bro. Co.	Cincinnati
A. Claus	Cleveland
Cleveland Desk Co.	Cleveland
Cleveland Store Fixture Co.	Cleveland
Diamond Show Case Co.	Cleveland
Theo. Kimdtz	Cleveland
W. B. McAlester Co.	Cleveland
Marcus A. Monaghan	Cleveland
National Fixture Co.	Cleveland
Fred Pollard	Cleveland
Wm. Russ & Co.	Cleveland
Model Show Case Co.	Columbus
Modern Show Case Co.	Columbus
Columbus Bar Fixture Co.	Columbus
J. S. McLean	Columbus
Wm. M. Taylor Mantel & Grate Co.	Columbus
C. T. Nelson Co.	Columbus
Sun Mfg. Co.	Columbus
M. Ohmers Sons Co.	Dayton
National Cash Register Co.	Dayton
Herman Ricker & Sons	Delphos
Woodenware Ventilator Co.	E. Palestine
Edon Furniture Mfg. Co.	Edon
The Waddell Woodenware Works Co.	Greenfield
Harrison Seating Co.	Harrison
West Side Lumber Co.	Lancaster
Smith & Sherrich	Lima
Adam Gross	Mansfield
A. L. Rhinr.	Massillon
W. C. Heller & Co.	Montpelier
Fridman Seating Co.	New Richmond
American Case & Register Co.	Salem
The Tiffin Mfg. Co.	Tiffin
T. J. Collins & Co.	Toledo
The Yesbera Mfg. Co.	Toledo
Hein Furniture Co.	Toledo

FRAMES AND MOLDINGS

Pape Bros. Molding Co.	Cincinnati
Queen City Marine Ry. Co.	Cincinnati
Reuhl Molding Mfg. Co.	Cincinnati
L. A. Stroble Co.	Cincinnati
The Gebs Molding & Mfg. Co.	Cincinnati
Wm. Schaber	Cleveland
The Zimmerman Co.	Cleveland
The Goodsell Mfg. Co.	Toledo

FURNITURE

F. M. Shaffer	Applecreek
Goehring Mfg. Co.	Akron
Kauffman Mfg. Co.	Ashland
B. L. Marble Chair Co.	Bedford
Bryan Show Case Co.	Bryan
Mersman Bros., Brandts Co.	Celina
Scioto Valley Casket Co. & Bonner Bros.	Chillicothe
Art Joinery Co.	Cincinnati
J. F. Dietz & Co.	Cincinnati
Ballman Cabinet Co.	Cincinnati
Beck & Mueller	Cincinnati
Dexter Lbr. Co.	Cincinnati
Eugene Berninghause Co.	Cincinnati
Betts-Street Furn. Co.	Cincinnati
Geo. Keyer & Co.	Cincinnati
The Robert Mitchell Furniture Co.	Cincinnati
Closterman	Cincinnati
Modern Furniture Co.	Cincinnati
J. Dornette & Bros. Co.	Cincinnati
Oscar Onken Co.	Cincinnati
Ficks-Reed Co.	Cincinnati
A. Renesch & Co.	Cincinnati
Globe Wernicke Co.	Cincinnati
Fred S. Lubke Sons	Cincinnati
Meyer Bros. Furn. Co.	Cincinnati
Joseph Scheid Sons Co.	Cincinnati
Schirmer Furn. Co.	Cincinnati
Schmit Furniture Co.	Cincinnati
Sextro Mfg. Co.	Cincinnati
Steinman & Meyer Furn. Co.	Cincinnati
Stille & Duhlmeier Co.	Cincinnati
The S. F. Streit Mfg. Co.	Cincinnati
Withrow Mfg. Co.	Cincinnati
Beelman Cabinet Co.	Cleveland
Champion Bed Spring Co.	Cleveland
Theo. Kuntz	Cleveland
D. T. Owen Co.	Cleveland
E. M. Hulse Co.	Columbus
The Hildreth & Martin Lbr. Co.	Columbus
Sun Mfg. Co.	Columbus
Burkhardt Furn. Co.	Dayton
F. A. Requarth Co.	Dayton
Mutual Mfg. Co.	Dayton
Delaware Chair Co.	Delaware
Edon Furniture Co.	Edon
Findlay Mfg. Co.	Findlay
Freemont Furn. Co.	Freemont
J. J. Schellkop	Freemont
The Gallia Furn. Co.	Gallipolis
Ohio Valley Furn. Co.	Gallipolis
West End Planing Mill	Gallipolis
The Geyler Furn. Mfg. Co.	Hillsboro
Kunkle Mfg. Co.	Kunkle
The Logan Mfg. Co.	Logan
Snider Mfg. Co.	Logan
The Manchester Furn. Co.	Manchester
Ohio Valley Furn. Co.	Manchester
Adam Gross	Mansfield
Roderick Dean Mfg. Co.	Mansfield
A. L. Rhinr.	Massillon
Marietta Chair Co.	Marietta
Marysville Cabinet Co.	Marysville
Newark Ohio Furn. Co.	Newark
The Ward-Stilson Co.	New London
Geo. S. Stewart Co.	Norwalk
The Cron, Kills & Co.	Piqua
The King Mfg. Co.	Piqua
The Piqua Furn. Co.	Piqua
Sprague Smith Co.	Piqua
Breece Mfg. Co.	Portsmouth
Wait Furn. Co.	Portsmouth
The Sutter Mfg. Co.	Shelby
The Reed Mfg. Co.	Springfield
The Tippecanoe Furn. Co.	Tippecanoe
The Ames Bonner Co.	Toledo
Schauss Parlor Frame Co.	Toledo
Hein Furniture Co.	Toledo
Toledo Desk & Fixture Co.	Toledo
The Barlow & Kent Co.	Urbana
Groll Bros.	Waldo
The M. Brown Co.	Wapakoneta
The King Furn. Co.	Warren
The Western Reserve Furn. Co.	Warren
C. L Kraig Mfg. Co.	Washington C. H.
The Zanesville Furn. Co.	Zanesville

HANDLES

Geo. H. Kephart & Son	Ada
The Baker McMillan Co.	Akron
Whitman & Barnes	Akron
Ashland Handle Mfg. Co.	Ashland
F. E. Meyers & Bro.	Ashland
Winchester "D" Handle Co.	Attica
T. & A. Rogers	Barnesville
S. G. Wright	Bergholtz
Hunter Brush Mfg. Co.	Blanchester
Ash & Mills	Bryan
The Richland Handle Works	Butler
Buckeye Handle Co.	Canfield
Canfield Mfg. Co.	Canfield
F. E. Kohler Co.	Canton
The Ney Mfg. Co.	Canton
H. C. Long Handle Factory	Cardington
Carey Bending Co.	Carey
W. H. Snyder	Carey
The Ober Mfg. Co.	Chagrin Falls

NAME	TOWN
Valley Mfg. Co	Chillicothe
National Handle Co	Cleveland
C. E. Taft	Cleveland
The Kilbourne & Jacobs Mfg. Co	Cleveland
Columbiana Mfg. Co	Columbiana
Creston Handle Co	Creston
Dayton "D" Handle Co	Dayton
McKenzie Lbr. Co	Delaware
John C. Shaffer	Delphos
Lloyd Bros	Doylestown
National Handle Co	Findley
Galion Handle & Mfg. Co	Galion
The Weaver Bending Co	Galion
The Potter Mfg. Co	Geneva
Delk Mfg. Co	Greenville
F. E. Schumacher Co	Hartville
Wood Novelty Co	Harrod
Crook, Son & Co	Hicksville
Miller Mfg. Co	Hicksville
The F. E. Kohler Co	Louisville
Middlefield Basket & Veneer Co	Middlefield
Hawkins Co	Minerva
Vingling Bros. & Co	Monroeville
Napoleon Lbr. & Handle Co	Napoleon
Clark, Allen & Co	New Bremen
The Bell Handle Co	New Bremen
The Columbia Mfg. Co	New Philadelphia
The Gallup Ruffin Hdl. Co	Norwalk
The McGrillis Handle Co	Norwalk
Geo. S. Stewart Co	Norwalk
J. W. Vickes & Son	Piedmont
Piqua Handle & Mfg. Co	Piqua
Dalk Bros	Prospect
Sandusky Tool Co	Sandusky
C. R. Benjamin & Son	Sidney
E. E. Gilbert	Smithville
F. F. Kohler	South Zanesville
Summerfield Lbr. Co	Summerfield
W. S. Fulton	Sugar Creek
A. R. Criddle	Tiro
The Hicksville Hdl. Co	Toledo
H. A. Bollz	Wapakoneta
Acme Handle Co	Warren
Warren Handle Works	Warren
The Washington Handle Co	Washington C. H.
The Wauseon Handle Co	Wauseon
The Neverslip Wire Stretcher Co	W. Farmington
The Rippe Mfg. Co	W. Lafayette
Chancelor Bros	Wilmington
Wayne Lbr. & Mfg. Co	Wooster

LAUNDRY APPLIANCES

Monarch Mfg. Co	Bascom
The Cardington Cabinet Co	Cardington
American Laundry Mch. Mfg. Co	Cincinnati
The Atlas Laundry Mch. Co	Cincinnati
Art Joinery Co	Cincinnati
Washing Mch. Co	Cincinnati
Dana Mfg. Co	Cincinnati
Eagle Woodenware & Mfg. Co	Hamilton
The Easy Washing Mch. Co	St. Mary's
The Buckeye Churn Co	Sidney
The A. I. Root Co	Medina
American Woodenware Mfg. Co	Toledo

MACHINERY CONSTRUCTION

Bellefontaine Fdy. & Mch. Co	Bellefontaine
Bean Spray Pump Co	Berea
Knight Mfg. Co	Canton
Case Crane Co	Columbus
The Jeffery Mfg. Co	Columbus
Seagrove Co	Columbus
Enterprise Mfg. Co	Columbiana
Turner-Vaughn Taylor Co	Cuyahoga Falls
W. C. Freece & Co	Findlay
C. S. Bell Co	Hillsboro
The Lima Locomotive & Machine Co	Lima
Aultman-Taylor Mchy. Co	Mansfield
The Fairbanks Steam Shovel Co	Marion
Marion Steam Shovel Co	Marion
Russell & Co	Massillon
Hydraulic Press Mfg. Co	Mt. Gilead
The Arnold-Greagor Co	New London
Cyclone Drilling Co	Orrville
Buckeye Engine Co	Salem
The Bauer Bros. Co	Springfield
Mentger Folding Machine Co	Sidney
Loomis Machine Co	Tiffin
McMyler Interstate Co	Tiffin

MISCELLANEOUS

Davis & Siehl	Cincinnati
Dexter Lumber Co	Cincinnati
Allis-Chalmers Co	Cincinnati
American Cigar Mold Co	Cincinnati
Miller, DuBrul & Peters Mfg. Co	Cincinnati
Rebhun Last Co	Cincinnati
Cincinnati Artificial Limb Co	Cincinnati
Buckeye Stereopticon Co	Cleveland
P. A. McHugh	Cleveland
Cleveland Artificial Limb Co	Cleveland
Sun Mfg. Co	Columbus
The Jeffery Mfg. Co	Columbus
Coshocton Glass Co	Coshocton
National Sign Co	Dayton
Buckeye Lumber Co	East Liverpool
Self-Lifting Piano Truck Co	Findlay
Geo. J. Mulzer	Galena
O. H. Burdette & Co	New Athens
The Burk Gol' Shaft Co	Newark
The W. J. Clark Co	Salem
Sandusky Tool Co	Sandusky
Wagner Mfg. Co	Sidney
The Reed Mfg. Co	Springfield
Phoenix Box Factory	Toledo

MATCHES

Reliable Match Co	Ashland
Diamond Match Co	Barberton
The Pan-American Match Co	North Baltimore
Ohio Match Co	Wadsworth

MUSICAL INSTRUMENTS

Hillgreen, Lane & Co	Alliance
The Baldwin Co	Cincinnati
Krell Piano Co	Cincinnati
F. L. Raymond & Co	Cleveland
Henry Holtzman & Sons Co	Columbus
H. W. Worley	Columbus
Compton-Price Piano Co	Coshocton
Stevens Organ Works	Marietta
Ackerman & Lowe Piano Co	Marion
Meister Piano Co	Monroeville
The A. B. Chase Co	Norwalk
A. J. Schantz	Orrville
The Carl Barkhoff Co	Pomeroy
Wirsching Organ Co	Salem

PATTERNS AND FLASKS

McMyler Interstate Co	Bedford
Bellefontaine Foundry & Mch. Co	Bellefontaine
Bucyrus Steel Casting Co	Bucyrus
The Fulton Pit Car Co	Canal Fulton
Chas. H. Lind	Canton
Allis Chalmers Co	Cincinnati
Cincinnati Car Co	Cincinnati
Cincinnati Steel Casting Co	Cincinnati
The Crook Pattern Works	Cincinnati
The Cincinnati Traction Co	Cincinnati
Eagle Mfg. Co	Cincinnati
A. Lukenheimer & Co	Cincinnati
Ohio Pattern Works	Cincinnati
Cleveland Steel Casting Co	Cleveland
Melvin Bros	Cleveland
Otis Steel Co	Cleveland
Peerless Motor Car Co	Cleveland
Ralston Steel Car Co	Cleveland
The Kilbourne & Jacobs Mfg. Co	Cleveland
The Jeffery Mfg. Co	Cleveland
The Seagrove Co	Cleveland
Hocking Valley Railway	Columbus
Turner-Vaughn Taylor Co	Cuyahoga Falls

NAME	TOWN
Motznick Bros.	Cuyahoga Falls
The Barney E. Smith Car Co.	Dayton
Davis Sewing Machine Co.	Dayton
Dayton Body Co.	Dayton
Gebhart Wuichet Lbr. Co.	Dayton
The H. P. Deuseher Co.	Hamilton
The Long & Allstatter Co.	Hamilton
Lima Locomotive & Machine Co.	Lima
Humphrey Mfg. Co.	Mansfield
Ohio Tractor Co.	Marion
The Fairbanks Steam Shovel Co.	Marion
Marion Steam Shovel Co.	Marion
The Marion Lumber Co.	Marion
Russell & Co.	Massillon
Cyclone Drilling Co.	Orrville
Portsmouth Steel Co.	Portsmouth
Buckeye Engine Co.	Salem
The Silver Mfg. Co.	Salem
Wagner Mfg. Co.	Sidney
Sidney Tool Co.	Sidney
The Bauer Bros. Co.	Springfield
Carnegie Steel Co.	Youngstown
Youngstown Steel Tube Co.	Youngstown

PLANING MILL PRODUCTS

Ada Coal & Lbr. Co.	Ada
G. V. Kern	Adamsville
Akron Lbr. Co.	Akron
Clements & Allen	Akron
Fisher & Bro.	Akron
Goehring Mfg. Co.	Akron
Star Planing Mill Co.	Akron
Summit Lumber & Building Co.	Akron
The F. H. Weeks Lbr. Co.	Akron
White Lumber Co.	Akron
I. G. Tolerton & Son.	Alliance
C. S. Westover.	Alliance
J. T. Weybrecht's Sons.	Alliance
The Amherst Supply Co.	Amherst
Riverside Mill Co.	Antiquity
E. P. Gerber.	Applecreek
Gatshall Bros.	Archbold
S. T. Hoover.	Armstrong Mills
J. G. Laird Lbr. Co.	Ashtabula
J. E. Strubbe.	Ashtabula
Athens Lbr. Co.	Athens
Rardin Bros. Lbr. Co.	Athens
Bemendefer & Co.	Attica
W. R. Lynn	Atwater
A. H. Regula & Co.	Baltic
J. E. Doudna.	Bannock
Etling Lbr. & Mfg. Co.	Barberton
Mathie & Lutz.	Barberton
T. & A. Rogers.	Barnesville
Beach City Lbr. Co.	Beach City
E. L. Miller.	Bedford
Dubois & McCoy Lbr. Co.	Bellaire
J. W. Neff & Son.	Bellaire
A. Lesourd & Sons.	Bellefontaine
Gross Lbr. Co.	Bellevue
J. M. Gordon.	Belmont
Ira Stanley.	Beloit
W. H. Wittenmyer.	Benton Ridge
J. E. Crabs.	Bergholtz
John W. Kimmel.	Bluffton
Bremen Mill & Lbr. Co.	Bremen
J. W. Stiger.	Bradner
Colter & Co.	Bucyrus
White Lbr. & Coal Yard.	Bucyrus
C. H. Johnson.	Burton
W. E. Winkler.	Butler
Byesville Planing Mill Co.	Byesville
J. H. Mills.	Caldwell
The West Side Planing Mill Co.	Caldwell
C. W. Forney.	Cambridge
Hoyle & Scott.	Cambridge
W. A. Hunt.	Cambridge
Collier & Boer.	Canal Dover
Wagner Lumber Co.	Canal Dover
C. Gilcher.	Canal Fulton
Canfield Lumber Co.	Canfield
Brumbaugh Lbr. Co.	Canton
David Hinton	Canton
Holwick Lbr. Co.	Canton
W. H. Snyder.	Carey
P. Kuntz & Herr Lbr. Co.	Celina
Chardon Bldg. Sup. Co.	Chardon
A. J. Rhodes.	Chardon
Chesterland Bldrs. Sup. Co.	Chesterland
Beelman Mfg. & Supply Co.	Chicago
Nolze Lbr. Co.	Chillicothe
Beck & Mueller	Cincinnati
Bentel Bros.	Cincinnati
Cincinnati Floor Co.	Cincinnati
M. B. Farrin	Cincinnati
Chas. Ferris Lbr. Co.	Cincinnati
Hyde Park Lbr. Co.	Cincinnati
Meador Interior Work Co.	Cincinnati
Chas. Rosentiel & Son.	Cincinnati
Clarington Planing Mill Co.	Clarington
Advance Lbr. Co.	Cleveland
The Barner-Mead Lbr. Co.	Cleveland
The Cleveland Lbr. Co.	Cleveland
The Cuyohoga Lbr. Co.	Cleveland
Fisher & Wilson Co.	Cleveland
Gray Lumber Co.	Cleveland
Lake Erie Lbr. Co.	Cleveland
Lake Shore Saw Mill & Lbr. Co.	Cleveland
Lakewood Lbr. Co.	Cleveland
Mills-Carlton Co.	Cleveland
Potter, Teare & Co.	Cleveland
Reaugh & Son.	Cleveland
Rocky River Lbr. Co.	Cleveland
Saginaw Bay Co.	Cleveland
Otis Still Co.	Cleveland
The Willson Ave. Lbr. Co.	Cleveland
Collinwood Lbr. Co.	Collinwood
F. Bairman Lbr. Co.	Columbus
Buttles Ave. Lbr. Co.	Columbus
The Doddington Co.	Columbus
The East Side Lbr. Co.	Columbus
The C. T. Nelson Co.	Columbus
J. J. Snider Lbr. Co.	Columbus
Pond Lumber Co.	Conneaut
S. W. Gray.	Coolville
Thomas Colopy.	Coshocton
E. S. Heestand.	Damascus
Davis Sewing Machine Co.	Dayton
Hiestand & Co.	Dayton
McKenzie Lbr. Co.	Delaware
E. S. Firestone.	Dellroy
Herman Ricker & Sons.	Delphos
H. L. Niles.	Delta
Lytle Lbr. Co.	Deshler
Dresden Lbr. Co.	Dresden
Buckeye Lbr. Co.	East Liverpool
C. Nease & Co.	East Liverpool
W. A. Cheney.	East Orwell
Elyria Lbr. & Coal Co.	Elyria
Parsch Lbr. Co.	Elyria
H. H. Fassett Estate.	Findlay
M. D. Neff & Co.	Findlay
Parker Bros.	Findlay
J. C. Blaine.	Frazeysburg
A. J. Peterman.	Fredericksburg
McMath & Kelly.	Freeport
Freemont Lbr. & Sup. Co.	Fremont
Price Lbr. & Mfg. Co.	Fremont
Galion Lbr. Co.	Galion
A. C. Gledhill.	Galion
O. A. Odell.	Gallipolis
P. J. Sherman.	Gates Mills
F. H. Hopkins	Ghent
The Athens Lumber Co.	Glouster
J. Guttensohn.	Gradenhutten
Geo. E. Hersh	Grand Rapids
W. H. Pommer Mfg. Co.	Greenfield
The Banner Lumber Co.	Greenville
H. L. Wright.	Greenwich
Gilbert Lbr. Co.	Groverhill
East Ave. Planing Mill.	Hamilton
Panning Bros.	Hamler
Clemmer & Johnson.	Hicksville
Chas. H. Goller.	Hicksville
Enterprise Planing Mill Co.	Hillsboro
Holgate Lbr. Co.	Holgate
Gross Bros.	Homeworth

NAME	TOWN
Abele-Kimmels Lbr. Co.	Ironton
W. E. Dawkins Lbr. Co.	Ironton
Fearon Lbr. & Veneer Co.	Ironton
Yellow Poplar Lbr. Co	Ironton
Ward Lumber Co	Ironton
Buckeye Mill & Lbr. Co.	Jackson
Jackson Mill & Lbr. Co.	Jackson
Steinman Bros.	Jenera
J. B. Hodges	Johnstown
John Callam & Co.	Kenton
Robinson-Gage Lbr. Co.	Kenton
John C. & W. Duncan	Killbuck
Joseph Kuhn & Bro	Kuhn
John Darfus	Lancaster
Edward Delancy	Lancaster
Orman Bros	Lancaster
West Side Lbr. Co.	Lancaster
Jos. A. Slauser Lbr. Co.	Larue
John Armstrong	Laurelville
Monroe & Johnston	Lebanon
The James McDonald Lbr. Co.	Leipsic
Ruhlen & Miller	Lima
F. McGirr	Little Hocking
Lockland Lumber Co	Lockland
C. E. Stockwell	Lockwood
The Lorain Lbr. & Mfg. Co.	Lorain
The Louisville Lbr. Co.	Lorain
The Wood Lbr. Co	Lorain
M. O. Sherer	Louisville
Loveland Lbr. & Mfg. Co.	Loveland
Lowell Planing Mill Co	Lowell
M. C. True & Co.	Lower Salem
Jones Lumber Co.	McConnellsville
A. N. Benjamin	Madison
Malta Mfg. Co	Malta
Fred Buel & Son	Malvern
Constance Lbr. Co	Mansfield
S. N. Ford & Co.	Mansfield
Mansfield Lbr. Co.	Mansfield
A. L. Jeffrey	Marengo
Central Mfg. Co	Marietta
The H. C. King Lbr. Co	Marion
The Marion Lbr. Co	Marion
The Slouser Lbr. & Coal Co.	Marion
Marysville Wire Fence & Lbr. Co.	Marysville
Brown Lumber Co.	Massillon
Jacob Horr	Mechanicsburg
Stoker Bros.	McComb
Caldwell & Iseminger	Middletown
Chas. E. Denny	Middletown
Geo. Dome, Jr.	Middletown
E. I. Harlan	Middletown
Middletown Lbr. Co.	Middletown
Adams, Marchland & Co.	Millersburg
Millersburg Lbr. Co.	Millersburg
C. T. Daniels	Minerva
Emerson Cox	Minerva
Mowrytown Lbr. Co.	Mowrytown
Minster Lbr. Co.	Minster
John Leonhart	Napoleon
Napoleon Lbr. & Handle Co.	Napoleon
Robert Hug	Navarre
M. A. Kreig & Co.	Nelsonville
Orwiler & Armstrong	Nevada
E. H. Cochlan	Newark
Nutter & Sons	Newark
Heinfeldt Mfg. Co	New Bremen
Reebe Mfg. Co	New Bremen
John L. Noble	New Concord
Andrew Kraiss	New Milford
The John Nagley Lbr. Co.	New Philadelphia
Wm. M. Thompson	New Philadelphia
Union Lbr. Co	New Philadelphia
Fridman Lbr. Co.	New Richmond
Peifer & Son	New Riegal
William May	New Springfield
Andrew Reesh	New Springfield
Newton Falls Basket Co.	Newton Falls
C. W. Wager	Newton Falls
New Washington Lbr. & Mfg. Co.	N. Washington
Chas. Fieldner	Ney
Henry J. Everett	North Baltimore
H. H. Lynn	North Jackson
Wm. Himberger & Co.	Norwalk
The S. M. Cole Co.	Oberlin
The Oberlin Lbr. & Coal Co.	Oberlin
Fred Kinney & Son	Orrville
E. A. Sellers	Orwell
Cramer & Johnston	Oxford
Thomas C. Lloyd	Oxford
S. L. Malin & Son.	Painesville
Laroo Company.	Painesville
Brooke Lumber Co.	Pataskala
H. F. Steffens	Pemberville
W. A. Clay	Piedmont
American Wagon Stock & Walnut Mfg. Co.	Piqua
C. L. Wood	Piqua
Nimmons & Nimmons	Plymouth
John Genheimer	Pomeroy
Pomeroy Lumber Co.	Pomeroy
Port Clinton Lbr. & Coal Co.	Port Clinton
E. M. Funk	Portsmouth
H. Leet Lumber Co.	Portsmouth
River City Lumber Co.	Portsmouth
D. L. Webb Co	Portsmouth
Prospect Lumber Co	Prospect
A. Cochran Co.	Quaker City
L. J. Hath	Randolph
J. P. Hoffman	Randolph
P. L. Frank	Ravenna
O. E. Sigler	Richmondale
The Ripley Mill & Lbr. Co.	Ripley
G. G. Meyers	Rising Sun
Brown Van Orman Co.	Rock Creek
Lewis Bros. Lbr. Co.	Rockford
The Peoples Lumber Co.	Salem
The Salem Lumber Co.	Salem
Sandusky Sash, Door & Lbr. Co.	Sandusky
Schoepfle Mfg. & Lbr. Co.	Sandusky
Peterson-Hiss Co.	Sandusky
S. Wilcox	Sciotoville
C. L. Matteson	Seville
Buckeye Churn Co.	Sidney
B. Worts	South Euclid
Springfield Planing Mill & Lbr. Co.	Springfield
Walter Ellis	Stockport
J. H. Good	Struthers
Stryker Boat Oar & Lbr. Co.	Stryker
St. Mary's Planing Mill Co	St. Marys
Jenkins & Davenport	St. Marys
Sugar Creek Lumber Co.	Sugar Creek
Mast Bros	Sugar Creek
Jenkins & Davenport	Summerfield
A. Laux	Swanton
J. A. Petty	Sycamore
Lease & Collier	Tiffin
Seneca Lumber Co.	Tiffin
Shilling & Son.	Tiro
Gotshall-Goodyear Co.	Toledo
J. G. Kuehnle & Co.	Toledo
Witker Mfg. Co.	Toledo
The C. H. Schroeder Co.	Toledo
Empire Lumber Co	Toledo
Campbell Lumber Co.	Toledo
Goulet & Company.	Toledo
Kelsey & Freeman	Toledo
The Guy Johnston Contracting Co.	Toronto
J. O. Goodwin & Son	Toronto
The Francis & Clemm Co.	Troy
W. A. Pearson	Troy
W. H. Snyder	Vanlue
C. Bachman	Vermillion
Wadsworth Lumber & Mfg. Co.	Wadsworth
John J. McMann	Wakeman
Warren Lumber Co.	Warren
Western Reserve Lumber Co	Warren
The West Side Lumber & Coal Co.	Warren
Coffman Lumber Co.	Washington C. H.
Parker & Wood Mfg. Co.	Washington C. H.
Oliver Lumber Co.	Waterford
H. H. Williams & Co.	Wauseon
Gehres Bros.	Waverly
Phelps Bros. & Co.	Wellington
The Cellar Lumber Co	Westerville
Oswald Bros	Weston
West Unity Mfg. Co.	West Unity
A. E. Baker	Wharton
John J. Berg	Whipple

NAME	TOWN
Shepherd & Son	Whipple
Chas. C. Jenkins	Willoughby
Fisher Mfg. & Fuel Co	Wilmington
Winchester Lumber Co	Winchester
John Burghbacher Lumber Co	Woodsfield
The D. C. Curry Lumber Co	Wooster
Geo. H. Dingledy Lumber Co	Youngstown
The Heller Bros. Co	Youngstown
Fred Hoffman's Sons	Youngstown
Huffman Bros	Youngstown
The Jacobs Lumber Co	Youngstown
The Mahoning Lumber Co	Youngstown
Scheetz Lumber Co	Youngstown
The B. C. Tibbits Lumber Co	Youngstown
The Youngstown Lumber Co	Youngstown
The Thos. Drake Lumber Co	Zanesville
The Herdman Sash, Door & Lbr. Co	Zanesville
F. L. Israel	Zanesville
John Groetziner	Zoar

PLAYGROUND EQUIPMENT

F. E. Myers & Bros	Ashland
Baltic Bending Co	Baltic
Thornburg Mfg. Co	Bowling Green
Withrow Mfg. Co	Cincinnati
The Robinson Curry Co	Marysville
Hardman Potters Crate & Box Co.	South Zanesville

PLUMBERS' WOODWORK

Buckeye Tank & Seat Co	Canton
John Douglass Co	Cincinnati
Louis Lipp Co	Cincinnati
Pfau Mfg. Co	Cincinnati
Buckeye Lumber Co	East Liverpool
Sanitary Mfg. Co	Hamilton
The Backer Mfg. Co	Marietta

PROFESSIONAL AND SCIENTIFIC INSTRUMENTS

Wagoner Mfg. Co	Sidney
The Ridgeley Trimmer Co	Springfield
Sandusky Tool Co	Sandusky

PULLEYS AND CONVEYORS

The Whitman & Barnes Mfg. Co	Akron
F. E. Myers & Bros	Ashland
The Ney Mfg. Co	Canton
Meader Interior Work Co	Cincinnati
The Columbiana Mfg. Co	Columbiana
Keasey Pulley Co	Toledo

PUMPS

Bean Spray Pump Co	Berea
Cincinnati Pump Co	Cincinnati
Rich Pump Co	Cincinnati
Clinton Mfg. Co	Sabina
Sabina Pump Co	Sabina
H. M. Balletine	Springfield
Mast Foos & Co	Springfield
The Consolidated Pump Co	Toledo

REFRIGERATORS AND KITCHEN CABINETS

Beck & Mueller	Cincinnati
The Betts-Street Furniture Co	Cincinnati
Cincinnati Butchers' Supply Co	Cincinnati
Cincinnati Fly Screen Co	Cincinnati
H. T. Kemper	Cincinnati
National Screen & Mfg. Co	Cincinnati
The C. Schmidt Co	Cincinnati
Tottenborn & Co	Cincinnati
Wm. Russ & Co	Cleveland
The Hildreth & Martin Lumber Co	Columbus
Hoo Hoo Kitchen Cabinet Co	Greenfield
Lockland Lumber Co	Lockland
Klanke Furniture Co	New Bremen
Sutter Mfg. Co	Shelby
Biederman Mfg. Co	Spencerville
The Tipp Bldg. & Mfg. Co	Tippecanoe
The B. A. Stevens Co	Toledo
The Barlow & Kent Co	Urbana
Kuhn Bros	Warsaw

SADDLES AND HARNESS

Bellefontaine Hame & Tool Co	Bellefontaine
Star Hame Co	Blanchester
Whirret Bros	Delphos
Fort Recovery Stirrup Co	Fort Recovery

SASH, DOORS, BLINDS AND GENERAL MILLWORK

Ada Coal & Lumber Co	Ada
Akron Lumber Co	Akron
Clements & Allen	Akron
Dietz Lumber Co	Akron
Fisher Bros	Akron
Goehring Mfg. Co	Akron
Lyman-Hawkins Lumber Co	Akron
Star Planing Mill Co	Akron
Summit Lumber & Building Co	Akron
The F. H. Weeks Lumber Co	Akron
I. G. Talerton & Son	Alliance
C. S. Westover	Alliance
J. T. Weybrechts Sons	Alliance
F. H. Gifford	Amesville
The Amherst Supply Co	Amherst
Gotshall Bros	Archbold
Shearer, Kagey & Co	Ashland
Ashley Lumber Co	Ashley
Fuller-Dodge Lumber Co	Ashtabula
The J. G. Laird Lumber Co	Ashtabula
J. E. Struble	Ashtabula
Athens Lumber Co	Athens
The Hardware Finish Co	Athens
Radin Bros Lumber Co	Athens
A. H. Begula & Co	Baltic
Buckeye Planing Mill Co	Baltimore
J. E. Doudna	Bannock
Etling Lumber & Mfg. Co	Barberton
D. S. Cook & Co	Basil
Beach City Lumber Co	Beach City
J. F. Dowler	Bedford
Dubois & McCoy Lumber Co	Bellaire
John W. Neff & Son	Bellaire
A. Lesourd & Sons	Bellefontaine
Gross Lumber Co	Bellevue
Belpre Mfg. Co	Belpre
John W. Kimmel	Bluffton
John Bigelow	Bowling Green
Bremen Mill & Lumber Co	Bremen
Stine & Ervin Lumber Co	Bryan
Colter & Co	Bucyrus
New Roehr Co	Bucyrus
White Lumber & Coal Yard	Bucyrus
C. H. Johnson	Burton
Byesville Planing Mill Co	Byesville
E. M. Long & Sons	Cadiz
J. H. Mills	Caldwell
The West Side Planing Mill Co	Caldwell
W. A. Hunt	Cambridge
Kittinger & Stock	Canal Fulton
Canfield Mfg. Co	Canfield
Brumbaugh Lumber Co	Canton
Holwick Lumber Co	Canton
P. Kuntz & Herr Lumber Co	Celina
C. A. Hertstentein & Co	Chillicothe
Nolze Lumber Co	Chillicothe
C. D. Schwartz	Chillicothe
Boercherding & Co	Cincinnati
G. J. Brethauer Planing Mill Co	Cincinnati
Bromwell Brush & Wire Goods Co	Cincinnati
Joseph Buschle	Cincinnati
Cincinnati Cabinet Co	Cincinnati
Cincinnati Fly Screen Co	Cincinnati
Clifton Stair Bldg. Co	Cincinnati
Evans & Co	Cincinnati
Evans-Rendigs Co	Cincinnati
M. B. Farrin Lumber Co	Cincinnati
James Griffith & Son's Co	Cincinnati
Hyde Park Lumber Co	Cincinnati
Geo. Keyer Co	Cincinnati
Linwood Lumber Co	Cincinnati
Lobnitz Co	Cincinnati

NAME	TOWN
M. Marcus Bldg. Co	Cincinnati
Wm. Mayer Co	Cincinnati
Meader Interior Work Co	Cincinnati
National Screen & Mfg. Co	Cincinnati
Henry Portman & Co	Cincinnati
Chas. Rosenstein & Son	Cincinnati
Chas. W. Short	Cincinnati
The Standard Mill Work Co	Cincinnati
Snook-Veith Lumber Co	Cincinnati
C. F. Thauwald & Co	Cincinnati
John C. Thom Co	Cincinnati
Ward-Brock Sash & Door Co	Cincinnati
Wilborg & Hanna Co	Cincinnati
Advance Lumber Co	Cleveland
Barner-Mead Lumber Co	Cleveland
The Cleveland Lumber Co	Cleveland
Cleveland Window Glass and Door Co	Cleveland
Diamond Glass Co	Cleveland
Fisher & Wilson Co	Cleveland
Gray Lumber Co	Cleveland
Lake Erie Lumber Co	Cleveland
Lake Shore Saw Mill & Lumber Co	Cleveland
Lakewood Lumber Co	Cleveland
Marquard Sash & Door Mfg. Co	Cleveland
Osborn & Flinkers	Cleveland
Peters Mill Work & Lumber Co	Cleveland
C. J. Pfiel Co	Cleveland
Reaugh & Son	Cleveland
Saginaw Bay Co	Cleveland
Singletary Lumber Co	Cleveland
Trebing Mfg. Co	Cleveland
Wm. Zeitz & Son Co	Cleveland
James Forsythe	Clyde
Earl Andrew	Columbus
The Doddington Co	Columbus
The East Side Lumber Co	Columbus
The Hildreth & Martin Lumber Co	Columbus
E. J. Jones & Co	Columbus
Jos. J. Know Lumbet Co	Columbus
Linkenheil Planing Mill Co	Columbus
J. S. McLean	Columbus
C. T. Nelson Co	Columbus
A. C. Sager	Columbus
J. J. Snider Lumber Co	Columbus
New Steelton Lumber Co	Columbus
Yardley Screen & Weather Strip Co	Columbus
Pond Lumber Co	Conneaut
Thos. Colopy	Coshocton
G. W. Spring	Crooksville
W. H. Stevens	Cumberland
Hopkins Lumber Co	Custar
Falls Lumber Co	Cuyahoga Falls
Motznick Bros	Cuyahoga Falls
Heibner & Clapper	Dalton
Dayton Lumber & Mfg Co	Dayton
Gebhart Wuichet Lumber Co	Dayton
Gem City Planing Mill & Lumber Co	Dayton
Heistand & Co	Dayton
F. F. Requarth Co	Dayton
John Rouser Co	Dayton
Cheney Lumber Co	Defiance
Diamond Glass Co	Defiance
H. B. Tenzer Lumber Co	Defiance
Clark & Battenfield	Delaware
McKenzie Lumber Co	Delaware
H. C. Thatcher & Co	Deshler
Dresden Lumber Co	Dresden
J. A. Orth	Dunkirk
Robt. Hall Lumber Co	East Liverpool
C. Nease & Co	East Liverpool
Geo. W. Gallant	Elmore
Elyria Lumber & Coal Co	Elyria
John B. Halpin Co	Elyria
H. H. Fassett Estate	Findlay
M. D. Neff & Co	Findlay
Parker Bros. & Co	Findlay
Wilson Lumber Co	Ft. Recovery
Eureka Planing Mill Co	Fostoria
The Koss & German Co	Fostoria
Price Lumber & Mfg. Co	Fremont
Galion Lumber Co	Galion
A. C. Gledhill	Galion
T. H. Hopkin Ghent	Gallipolis
O. A. Odell	Gallipolis

NAME	TOWN
T. L. Collier	Gibsonburg
Glenford Mfg. Co	Glenford
J. Guttensohn	Gradenhutten
W. H. Pommert Mfg. Co	Greenfield
The West End Planing Mill	Greenfield
The Banner Lumber Co	Greenville
P. Kuntz & Wright Lumber Co	Greenville
H. L. Wright	Greenwich
The Bender Co	Hamilton
East Ave. Planing Mill	Hamilton
Panning Bros	Hamler
F. E. Schumacher Co	Hartville
Clemmer & Johnson	Hicksville
Chas. A. Goller	Hicksville
Abele-Kimmels Lumber Co	Ironton
W. E. Dawkins Lumber Co	Ironton
Ward Lumber Co	Ironton
Buckeye Mill & Lumber Co	Jackson
Steinman Bros	Jenera
J. B. Hodges	Johnstown
John Callam Co	Kenton
Kenton Lumber Co	Kenton
Joseph Kuhn & Bro	Kuhn
John Darfus	Lancaster
Edward Delancy	Lancaster
Orman Bros	Lancaster
Jos. A. Slauser Lumber Co	Larue
Acme Lumber Co	Latham
J. F. Mellinger	Leetoma
Monroe & Jonnson	Lebanon
James McDonald Lumber Co	Leipsic
C. A. Metz	Lewisville
H. S. Moulton	Lima
Ruhlen & Miller	Lima
Smith & Sherrick	Lima
L. Blicker & Son	Lindsay
Caldwell & Neigh	Lisbon
Lockland Lumber Co	Lockland
Albert E. Lyons	Lockland
The Logan Mfg. Co	Logan
The Lorain Lumber Mfg, Co	Lorain
The Wood Lumber Co	Lorain
Loveland Lumber Mfg. Co	Loveland
Lowell Planing Mill Co	Lowell
Rechsteiner Bros	Lowell
Malta Mfg. Co	Malta
Valley Mantel Co	Malta
Fred Buel & Son	Malvern
S. N. Ford & Co	Mansfield
Constance Lumber Co	Mansfield
Mansfield Lumber Co	Mansfield
Marietta Mantel Co	Marietta
Central Mfg. Co	Marietta
The Marion Lumber Co	Marion
Robinson & Curry Co	Marysville
Brown Lumber Co	Massillon
Marysville Wire Fence & Lumber Co	Marysville
A. I. Root Co	Medina
Chas. Willoughby	McClure
Stoker Bros	McComb
The Grove & Weber Co	Miamisburg
The Jones Lumber Co	McConnelsville
Caldwell & Iseminger Co	Middletown
Geo. Dome, Jr	Middletown
Milford Planing Mill Co	Milford
Millersburg Lumber Co	Millersburg
Emerson Cox	Minerva
Mount Sterling Lumber Co	Mt. Sterling
Minster Lumber Co	Minster
Thiesen & Hildred	Napoleon
Robert Hug	Navarre
M. A. Kreig & Co	Nelsonville
E. H. Cochlan	Newark
Heinfeldt Mfg. Co	New Bremen
Reebe Mfg. Co	New Bremen
John L. Noble	New Concord
A. Cooke & Co	New Knoxville
Snider-Flautt Lumber Co	New Lexington
J. A. Flaig	New Madison
John Nagley Lumber Co	New Philadelphia
Union Lumber Co	New Philadelphia
Fridman Lumber Co	New Richmond
Peifer & Son	New Riegal
The Western Reserve Lumber Co	Niles

NAME	TOWN
Henry J. Everett	North Baltimore
Wm. Himberger & Co	Norwalk
Goodsell & Bostwick	Norwalk
D. C. Shank Co	Pandora
S. L. Malin & Son	Painesville
Paulding Lumber Co	Paulding
H. F. Steffen	Pemberville
Pomeroy Lumber Co	Pomeroy
H. Leets Lumber Co	Portsmouth
Prospect Lumber Co	Prospect
A. Cochran Co	Quaker City
Trares Bros	Ravenna
The Ripley Mill & Lumber Co	Ripley
Lewis Bros. Lumber Co	Rockford
The Peoples Lumber Co	Salem
The Salem Lumber Co	Salem
Schoepfle Mfg. & Lumber Co	Sandusky
Sandusky Sash, Door & Lumber Co	Sandusky
G. D. Spiker & Son	Scio
S. Wilcox	Sciotoville
The Buckeye Churn Co	Sidney
Shelby Lumber Co	Shelby
E. E. Gilbert	Smithville
C. J. Miller & Co	Smithville
Snider-Flautt Lumber Co	Somerset
Biederman Mfg. Co	Spencerville
Springfield Planing Mill & Lbr. Co	Springfield
John C. Fitzsimmons Lumber Co	Steubenville
W. McDowell & Son	Steubenville
St. Marys Planing Mill Co	St. Marys
Jenkins & Davenport	St. Paris
F. Weber Planing Mill Co	Strasburg
McFeely Bros	Steubenville
Walter Ellis	Stockport
The Pilliod Lumber Co	Swanton
J. H. Good	Struthers
Mast Bros	Sugar Creek
J. A. Petty	Sycamore
The Enterprise Mfg. Co	Tiffin
Lease & Collier	Tiffin
Seneca Lumber Co	Tiffin
The Booth Column Co	Toledo
Campbell Lumber Co	Toledo
The Goodsell Mfg. Co	Toledo
Goulet & Co	Toledo
Kelsey & Freeman	Toledo
C. H. Schroeder Co	Toledo
Toledo Trimming Co	Toledo
Witker Mfg. Co	Toledo
The Toledo Screen Co	Toledo
Trotter Lumber Co	Toledo
Western Mfg. Co	Toledo
Stephen Lumber Co	Toledo
The Wadsworth Lumber & Mfg. Co	Toledo
Murphy Lumber Co	Urbana
Warren Lumber Co	Warren
The Western Reserve Lumber Co	Warren
The West Side Lumber & Coal Co	Warren
Coffman Lumber Co	Washington C. H.
Parker & Wood Mfg. Co	Washington C. H.
Gehres Bros	Waverly
Bert Leighminger	West Lafayette
Oswald Bros	Weston
West Unity Mfg. Co	West Unity
A. E. Baker	Wharton
Shepherd & Son	Wilmington
Fisher Mfg. & Fuel Co	Wilmington
Winchester Lumber Co	Winchester
John Burgbacher Lumber Co	Woodsfield
Geo. H. Dingledy Lumber Co	Youngstown
Huffman Bros	Youngstown
The Heller Bros. Co	Youngstown
The Jacobs Lumber Co	Youngstown
The Mahoning Lumber Co	Youngstown
Scheetz Lumber Co	Youngstown
The B. C. Tibbits Lumber Co	Youngstown
The Thos. Drake Lumber Co	Zanesville
The Herdman Sash, Door & Lbr. Co	Zanesville
F. L. Israel	Zanesville

SPORTING AND ATHLETIC GOODS

Am. Billiard Table & Saloon Fixtures Co.	Cincinnati
National Billiard Mfg. Co	Cincinnati
Columbus Bar Fixture Co	Columbus
Crawford, McGregor & Canby Co	Dayton
International Golf Shaft Co	Dayton
The Burke Golf Shaft Co	Newark

TANKS AND VATS

Ada Coal & Lumber Co	Ada
Bean Spray Pump Co	Berea
Hauser, Brenner & Fath Co	Cincinnati
J. A. Orth	Dunkirk
Buckeye Lumber & Bldg. Co	East Liverpool
J. C. Blaine	Frazeysburg
The Anderson Tool Co	Hamilton
The Bender Co	Hamilton
East Avenue Planing Mill	Hamilton
John Callam Co	Kenton
J. P. Ridge	Marietta
W. R. Harrison & Co	Massillon
The Heller-Aller Co	Napoleon
R. T. Arrowsmith, Jr	Scio
The E. W. Ross Co	Springfield
Wm. F. Dahlmeyer Tank Co	Toledo
Meek Cistern Co	Toledo

TRUNKS AND VALISES

Geo. H. Kephart & Son	Ada
N. Drucker & Co	Cincinnati
Mendel & Co	Cincinnati
Schneider Bros	Cincinnati
Jas. Dunn Co	Cleveland
Likly & Rockett Trunk Co	Cleveland
John R. Hughes Co	Columbus
F. A. Stallman	Columbus
Wood Novelty Co	Harrod
John B. Duguid	Toledo
The Gotshall Mfg. Co	Toledo

VEHICLES AND VEHICLE PARTS

Akron-Selle Co	Akron
Geo. A. Collins & Sons	Akron
Anna Spoke Works	Anna
Athens Lumber Co	Athens
J. B. Heiser	Atwater
Baltic Bending Co	Baltic
J. E. Doudna	Bannock
Buckeye Carriage Body Co	Bellefontaine
A. J. Miller & Co	Bellefontaine
Sheets Mfg. Co	Botkins
Bryan Mfg. Co	Bryan
Buckeye Bending Co	Bucyrus
Bucyrus Bending Co	Bucyrus
Carey Bending Co	Carey
The Cardington Cabinet Co	Cardington
Ames Bending Co	Celina
Valley Mfg. Co	Chillicothe
Ahr & Rost Co	Cincinnati
American Wagon Co	Cincinnati
O. Armleder Co	Cincinnati
Bellvue Planing Mill Co	Cincinnati
Bode Wagon Co	Cincinnati
Buschle & Wuest	Cincinnati
Cincinnati Panel Co	Cincinnati
Crane & Breed Mfg. Co	Cincinnati
Haberer & Co	Cincinnati
Highland Body Co	Cincinnati
Geo. Keyer Co	Cincinnati
James Kidney Co	Cincinnati
Philip Klopp & Son	Cincinnati
Mill Creek Wagon Co	Cincinnati
Ohio Seat Co	Cincinnati
Sayers & Scoville Co	Cincinnati
C. B. Vandervort	Cincinnati
The Welland Co	Cincinnati
Withrow Mfg. Co	Cincinnati
Wm. Gaberail Co	Cleveland
Theo. Kuntz	Cleveland
Olstyn Carriage Co	Cleveland
Peerless Motor Car Co	Cleveland
The Rauch & Lang Carriage Co	Cleveland
Gustave Schafer Carriage & Wagon Co	Cleveland
Winton Motor Carriage Co	Cleveland
The Columbus Buggy Co	Columbus

NAME	TOWN
Excelsior Seat Co.	Columbus
Kilbourne & Jacobs Mfg. Co.	Columbus
The Seagrave Co.	Columbus
United States Carriage Co	Columbus
Wildermuth Bending Co	Columbus
Shultz Wagon Co.	Dalton
Borchers Carriage Co.	Dayton
S. N. Brown & Co.	Dayton
Buckeye Wagon & Motor Co.	Dayton
Chas. H. Cook	Dayton
Dayton Body Co.	Dayton
Otto Grau	Dayton
Meeker Mfg. Co	Dayton
Dayton Electric Car Co.	Dayton
Pinneo & Daniels	Dayton
Pioneer Wagon Works	Dayton
Speedwell Motor Car Co.	Dayton
M. Weber & Co	Dayton
Weber Bros	Dayton
Zwick & Greenwald Co	Dayton
Defiance Box Co	Defiance
Defiance Carriage Co.	Defiance
Turnbull Wagon Co.	Defiance
Delphos Bending Co.	Delphos
Oak Mfg. Co.	Edgerton
J. F. Haury Bending Works	Erkhart
D. E. Heisey	Farmersville
Findlay Carriage Co.	Findlay
M. D. Neff & Co.	Findlay
Self Lifting Piano Truck Co.	Findlay
Bimel Spoke & Auto Wheel Co	Fort Recovery
Cunningham Mfg. Co.	Fostoria
Koss & German Co.	Fostoria
J. C. Blaine	Frazeysburg
A. J. Peterman	Fredericksburg
G. A. Berger	Fremont
Lauth-Juergens Motor Car Co.	Fremont
West Wood Turning Co	Fremont
The Weaver Bending Co.	Galion
F. M. Arnold	Grand Rapids
John Donges & Co.	Hamilton
Panning Bros.	Hamler
L. B. Miller	Harrod
The M. F. Carroll & Sons Co	Hillsboro
Ketter Buggy Co	Ironton
Southern Wheel Stock Co.	Ironton
J. W. Talga	Ironton
Joseph Kuhn & Bro.	Kuhn
Edward Delancy	Lancaster
The Cass Hardwood Lbr. Co	Lima
The Louisville Lbr. C.	Louisville
Madison Wheel Co.	Madison
Ohio Valley Wagon Co.	Marietta
Cook Wagon Co	Marion
The Houghton Sulky Co.	Marion
McMurray Sulky Co.	Marion
W. R. Harrison & Co.	Massillon
Bookwalter Wheel Co.	Miamsburg
Enterprise Carriage Mfg. Co	Miamsburg
Mitchell Wheel Co.	Miamsburg
Milford Planing Mill	Milford
Adams Marchland & Co	Millersburg
Napoleon Lbr. & Handle Co.	Napoleon
The Burke Golf Shaft Co.	Newark
Newark Gear Wood Co.	Newark
Blair Mfg. Co.	Newark
The Wyeth Co.	Newark
Spicer Mfg. Co.	New Philadelphia
S. L. Malin & Son	Painesville
F. A. Witzler	Perrysburg
Port Clinton Buggy Co.	Port Clinton
Breece Mfg. Co.	Portsmouth
E. M. Funk	Portsmouth
Riddle Coach & Hearse Co.	Ravenna
Crane & MacMahon	St. Mary's
The W. H. Mullins Co.	Salem
G. N. Galbreath	Sherwood
Pioneer Pole & Shaft Co	Piqua
Sidney Mfg. Co.	Sidney
Sidney Tool Co.	Sidney
The Tucker Wood Work Co	Sidney
E. E. Gilbert	Smithville
F. F. Kohler	S. Zanesville
Zanesville Gearwood Co	S. Zanesville
Jas. Workman & Sons	Steubenville
Rome Spoke Works	Stout
W. S. Fulton	Sugar Creek
Shilling & Son	Tiro
The Tiffin Wagon Co.	Tiffin
Gendron Wheel Co.	Toledo
Milburn Wagon Co.	Toledo
The J. M. Skinner Co.	Toledo
The Toledo Bending Co	Toledo
Toledo Carriage Woodwork Co.	Toledo
Toledo Wheelbarrow Co	Toledo
Bickel & Null	Trotwood
E. H. Brandenburg	Trotwood
J. W. Devers	Trotwood
Pioneer Pole & Shaft Co.	Troy
The Star Storm Front Co.	Troy
The Troy Carriage Sunshade Co.	Troy
Troy Mfg. Co	Troy
The Ohio Mfg. Co.	Upper Sandusky
Wertz Buggy Co.	Wadsworth
Stevenson Buggy Co	Wadsworth
The New Wapakoneta Wheel Co	Wapakoneta
Warren Handle Works	Warren
Winchester Lbr. Co.	Winchester
Wayne Lbr. & Mfg. Co.	Wooster
Brown Mfg. Co	Zanesville
The Andrew Kimble Co.	Zanesville
H. J. Kimble Est	Zanesville
The Zanesville Gear Wood Co	Zanesville
The Youngstown Carriage & Wagon Co.	Youngstown

WOODENWARE AND NOVELTIES

Ashtabula Pail Co.	Ashtabula
J. E. Doudna	Bannock
Gibbs Mfg. Co.	Canton
Cardington Cabinet Co.	Cardington
Cincinnati Turning & Carving Co.	Cincinnati
Scioto Box Co.	Columbus
The Seagrave Co.	Columbus
Novelty Advertising Co	Coshocton
F. A. Requarth Co.	Dayton
Mutual Mfg. Co.	Dayton
Tettenborn & Co.	Dayton
Hughes & Smith	Galena
The Weaver Bending Co.	Galion
Wood Novelty Co	Harrod
Crook, Son & Co.	Hicksville
The Wood Lumber Co.	Lorain
The A. J. Root Co.	Medina
Ohio Pail Co.	Middlefield
The Ward Stilson Co.	New London
N. L. Shoup	New Springfield
The Newton Falls Mfg. Co.	Newton Falls
G. S. Stewart Co.	Norwalk
The King Mfg. Co.	Piqua
Consolidated Pump Co.	Toledo
John Nagley	Toledo
Phoenix Box Factory	Toledo
The Lyman Mfg. Co.	Warren
The Rippe Mfg. Co.	West Lafayette

APPENDIX

Several wood-using industries of Ohio were not included in this special study because they are covered by the annual reports of the Bureau of the Census. In considering wood consumption in Ohio these industries are of much importance and with a view of making this report more complete to the extent with which Bureau of Census statistics refer to Ohio, they have been copied and presented in the following compilations:

LUMBER, LATH AND SHINGLES

There were 1,148 sawmills in operation in Ohio in 1910. The cut, 490,000,000 feet, gave the State the rank of twenty-five among 41 lumber producing States. The increase was 9.7 percent over 1909, and 28 percent over 1908. The lumber cut according to kinds of wood reported by the sawmills was as follows:

Softwoods

Species	Number active mills	Sawed lumber M feet b. m.
Yellow pine	42	2,568
White pine	14	252
Hemlock	36	2,845
Spruce	8	176
Cedar	2	31
Tamarack	3	17
Total softwoods	...	6,889
Aggregate soft and hardwoods	.....	490,039

Hardwoods

Species	Number of active mills	Lumber sawed M feet b. m.
Oak	1,076	224,676
Maple	776	32,179
Tulip poplar	534	71,122
Red gum	131	1,534
Chestnut	400	14,576
Beech	765	39,498
Birch	26	930
Basswood	447	15,116
Hickory	755	20,022
Elm	650	24,199
Ash	673	22,815
Cottonwood	162	2,245
Tupelo	5	99
Sycamore	277	4,139
Walnut	320	6,915
All other	...	3,085
Total	...	483,150

Of the total sawed hardwood lumber, oak comprised approxi mately 46 percent, tulip poplar 15 percent, beech 9 percent, maple 7 percent, elm 5 percent, and the other woods in varying small amounts constituted the remainder. It is interesting to note that

Ohio stood first in the production of walnut lumber, though walnut is by no means the most important species of those manufactured in the State.

Shingles are manufactured principally from white pine, cedar, spruce and chestnut, and had in 1910 an average value at the mill of $2.98 per thousand. The total number of shingles manufactured in 1910 was 1,339,000, with a total value at the mill of $3,990.

The species used for lath are white pine, hemlock and yellow pine. The average value per thousand in 1910 was $3.57 at the mill and 14,737,000 were manufactured.

Fig. 29. A scene in yard of an Ohio stave factory. Mostly elm bolts but also some ash, maple, red oak, hickory, sycamore, and buckeye.

COOPERAGE STOCK

Two kinds of cooperage stock, slack and tight, are produced. Slack cooperage stock is the term applied to the materials essential in making barrels to contain apples, flour, cement, nails, etc. Tight cooperage stock is distinguished from slack by the fact that it is made usually to contain liquids or articles requiring a strong container.

Twenty-three kinds of wood were used for making slack staves in 1910, and red gum, pine, beech and elm were the woods used in greatest quantities. For heading the same woods were reported as were reported for staves except that maple takes the place of elm.

The total production of heading was 969,000 sets. Hoops, which are the coiled or patent hoops, are made of elm and in the quantity manufactured Ohio leads all states, the total being 92,494,000.

Species	Staves produced Thousands
Red gum	27
Pine	70
Beech	1,771
Elm	11,479
Chestnut	296
Maple	1,973
Ash	719
Oak	1,626
Cottonwood	596
All other	9,567
Total	28,123

VENEERS

The manufacture of veneers in Ohio has shown a steady increase in the last decade, due to the widening range of uses. Formerly veneer making was confined to a few hardwoods selected for beauty of grain and used as an exterior finish for high-grade furniture and cabinet work. The improvement of veneer machinery and methods of drying has developed a large demand for veneers made of cheap woods which are used for packing boxes, berry cups, fruit baskets, veneer barrels, drawer bottoms and filling in three-ply lumber.

Due to the increasing price of hardwood, built-up lumber of three-ply veneer has been extensively substituted for making furniture, fixtures and cabinets. Woods which have a tendency to twist and warp when sawed into boards can be used to advantage in the manufacture of this built-up lumber.

There are three principal methods of manufacturing veneer: rotary cutting, slicing and sawing. Rotary cutting is the method most extensively used, and by it all the cheap veneers are cut. Veneers made by slicing and rotary cutting are less expensive than by sawing, and the last method is therefore largely confined to the manufacture of high-grade finish veneers. Ohio is one of the unimportant states for manufacturing high-priced cabinet veneers. These not only include oak veneer, but mahogany and other foreign woods that are shipped in in the form of logs and veneer flitches.

In 1910 the wood consumed for veneers in Ohio was 11,832,000 feet log scale, which is more than twice the amount used in 1907 for the same purpose.

Ffg. 30. Coiling patent barrel hoops made from white elm. Ohio in 1911 leads all other States in the production of this commodity.

Year	Wood consumed M feet, log scale
1907	5,821
1908	7,873
1909	10,985
1910	11,832

PULP WOOD

The consumption of pulp wood in Ohio from 1907 to 1910 shows a decided decrease. The following table illustrates this fact:

Year	Number of mills	Wood consumed cords	Pulp produced tons
1907	4	59,110	31,205
1908	4	46,183	23,253
1909	4	55,275	26,977
1910	4	38 693	16 932

The average yield per cord of pulp wood for 1910, irrespective of the kind of wood or process used, was 1,238 pounds. The average approximate yield per cord by the ground wood process is 2,000 pounds, and by the sulphate and soda process 1,000 pounds.

The following table shows the consumption of Ohio pulp wood by kinds:

Kind of wood	Consumption in cords
Spruce	3,000
Hemlock	474
Poplar	734
Cottonwood	6,209
Slab and mill waste	28,226
Total	38,693